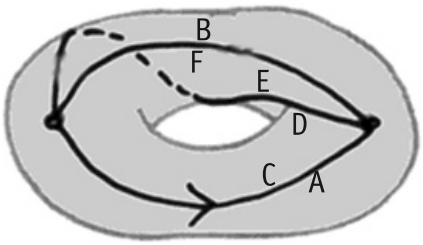
Practice First Exam AA

MATH V1011: Surfaces and Knots, Spring, 2003

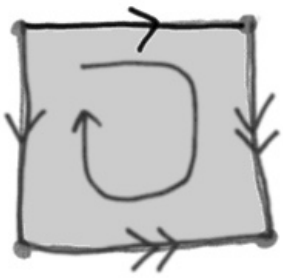
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



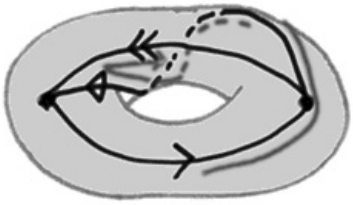
A	**B**	**D**	**C**	**F**	**E**	**A**

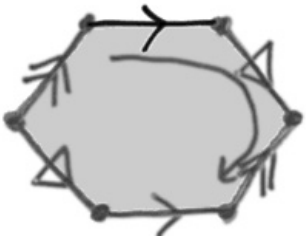
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

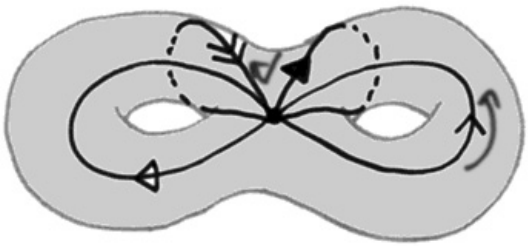
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

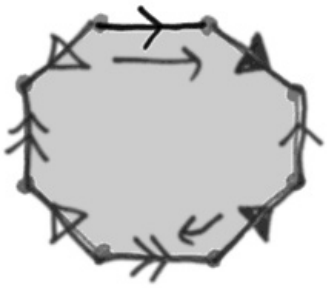




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

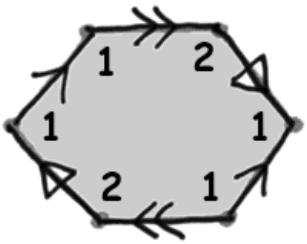
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





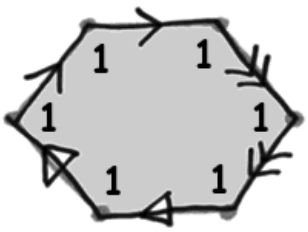
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 4 \\ +\ f & = \quad 1 \\ \hline \chi & = -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



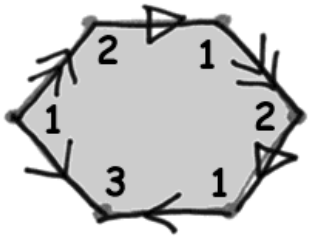
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



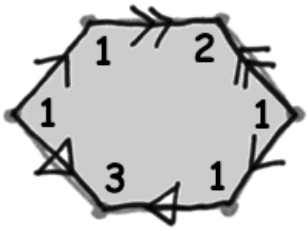
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

no



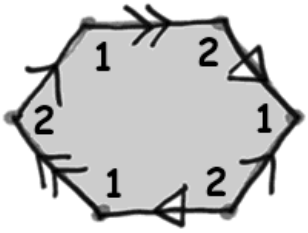
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



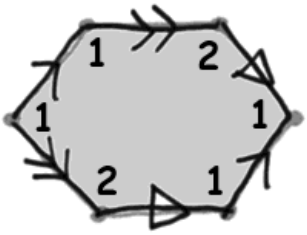
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



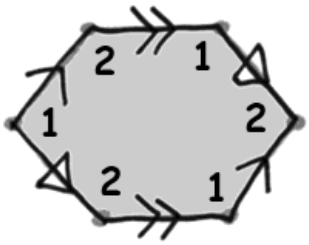
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



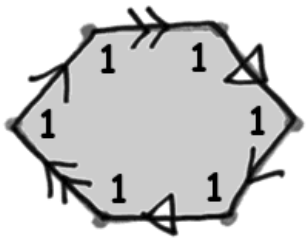
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

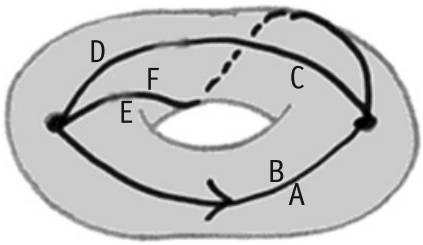
no

Practice First Exam AB

MATH V1011: Surfaces and Knots, Spring, 2003

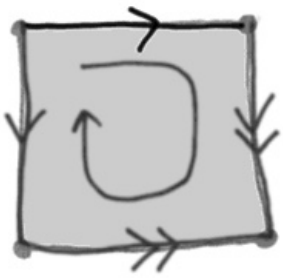
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



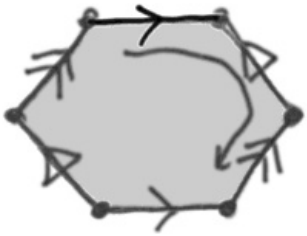
A	**F**	**C**	**B**	**E**	**D**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



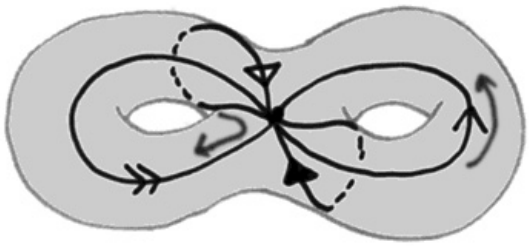
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

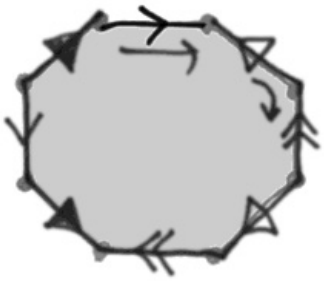
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

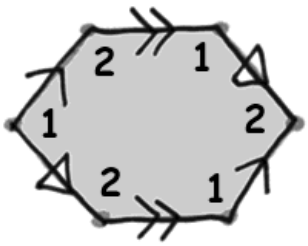
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





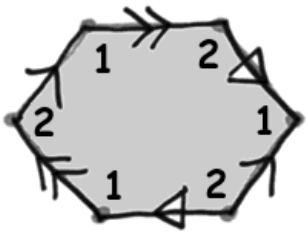
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



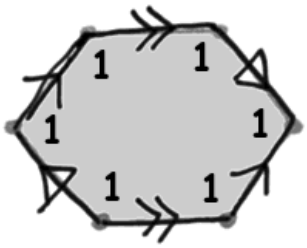
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



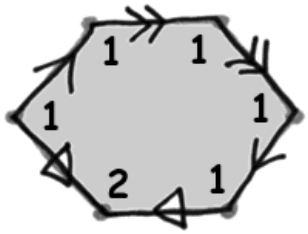
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



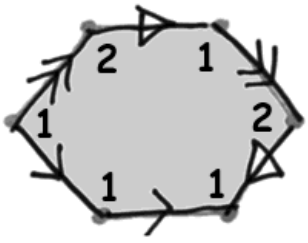
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



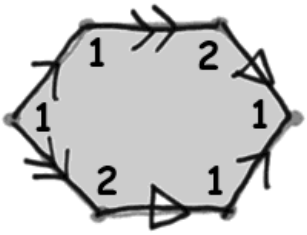
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



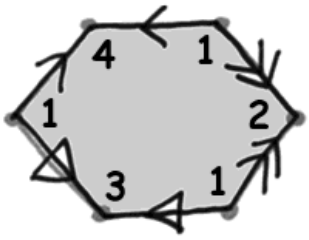
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



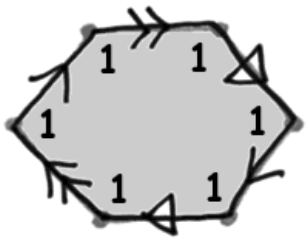
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

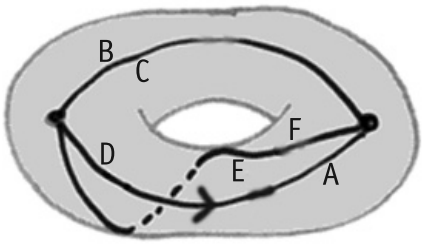
no

Practice First Exam AC

MATH V1011: Surfaces and Knots, Spring, 2003

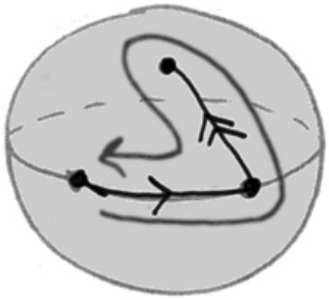
Answer Key

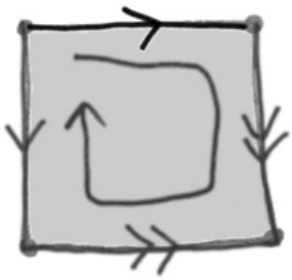
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**D**	**C**	**F**	**A**

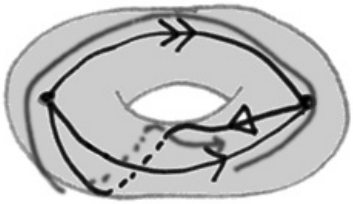
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

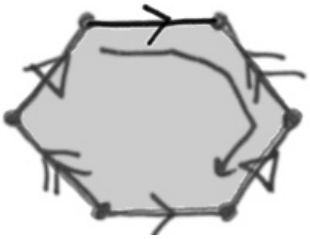




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

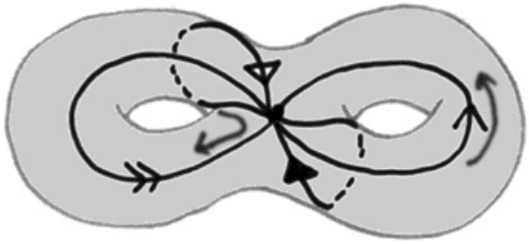
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

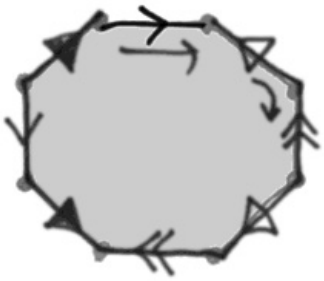




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

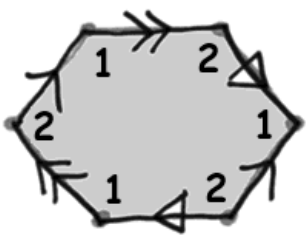
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





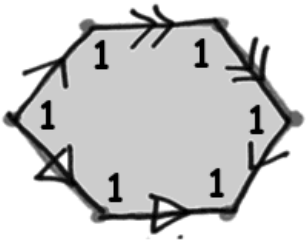
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



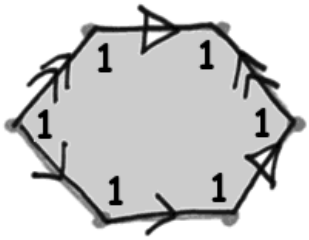
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



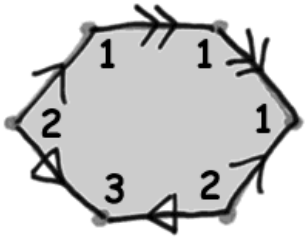
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



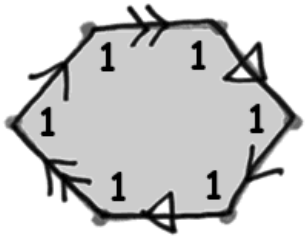
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



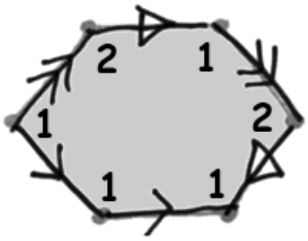
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



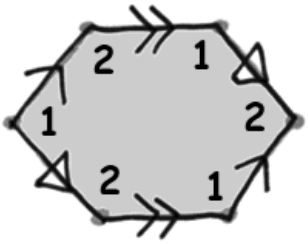
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



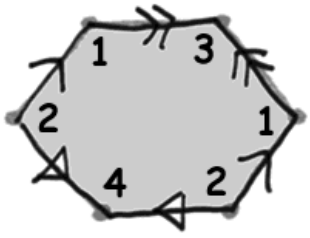
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

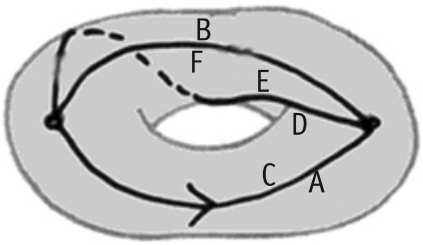
yes

Practice First Exam AD

MATH V1011: Surfaces and Knots, Spring, 2003

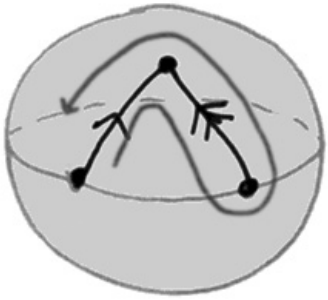
Answer Key

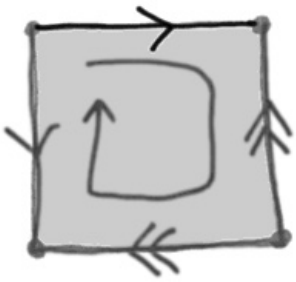
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**D**	**C**	**F**	**E**	**A**

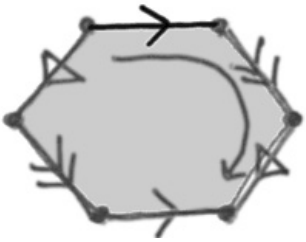
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





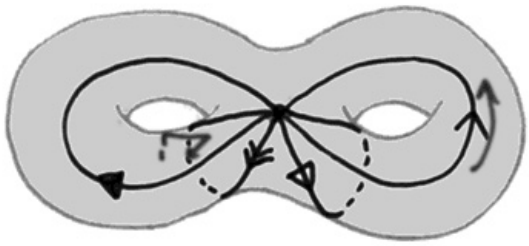
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

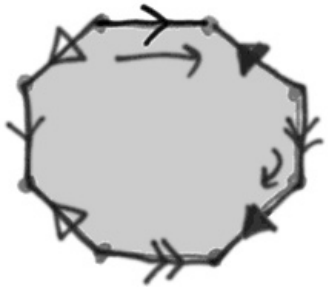
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

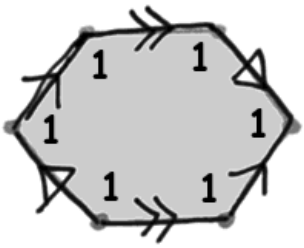
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





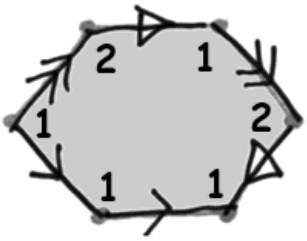
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



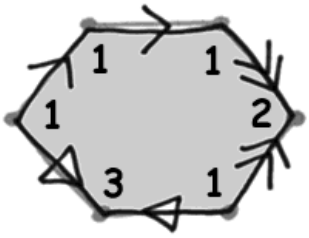
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



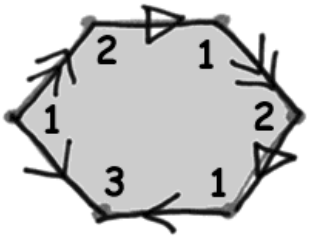
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



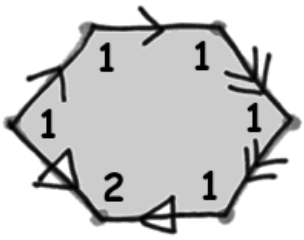
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



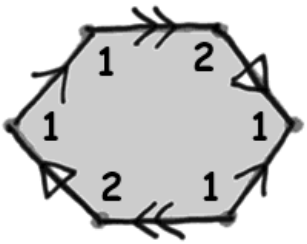
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



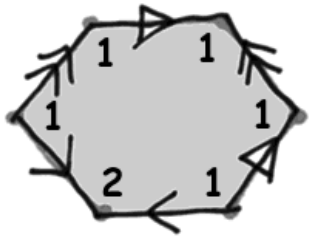
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



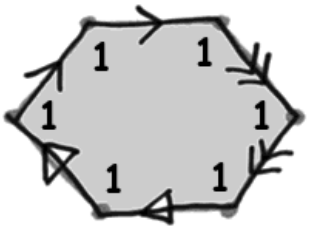
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

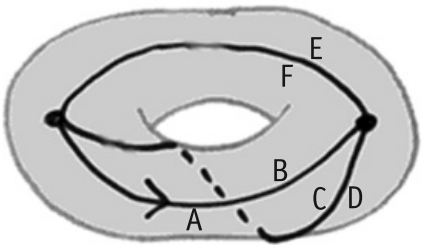
no

Practice First Exam AE

MATH V1011: Surfaces and Knots, Spring, 2003

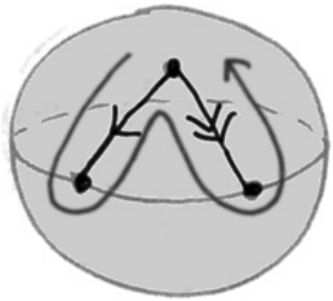
Answer Key

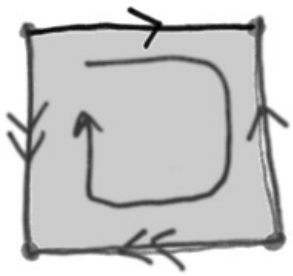
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**B**	**D**	**E**	**A**

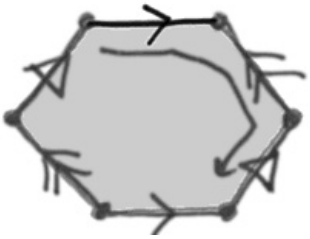
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





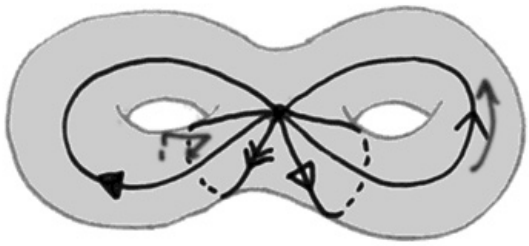
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

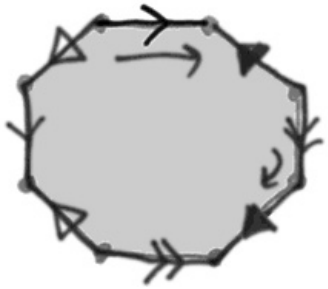
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

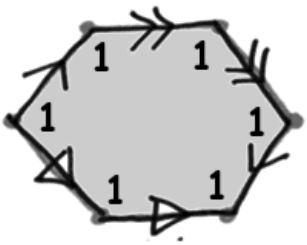
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





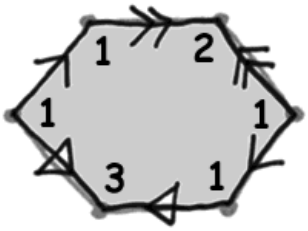
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



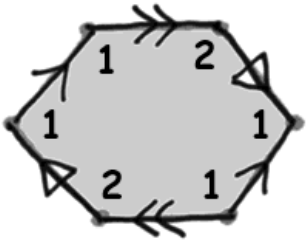
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



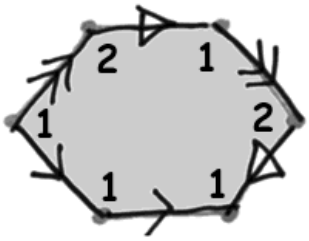
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



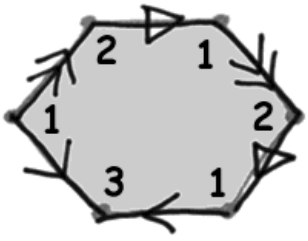
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



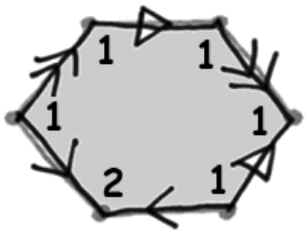
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



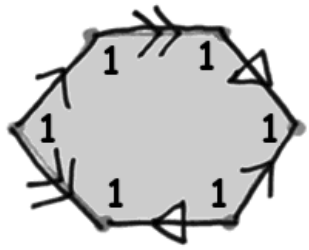
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



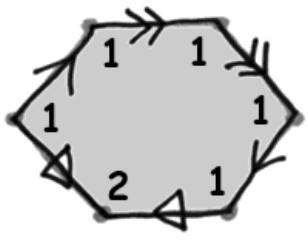
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

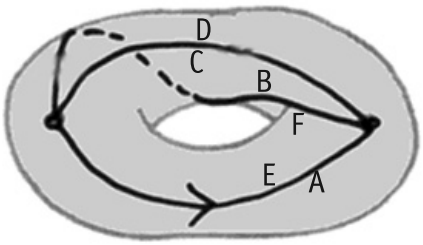
no

Practice First Exam AF

MATH V1011: Surfaces and Knots, Spring, 2003

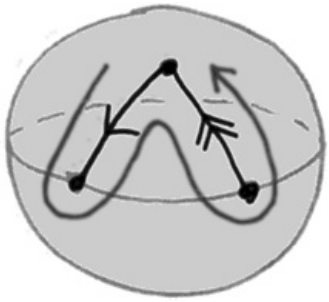
Answer Key

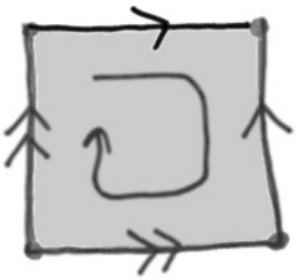
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**E**	**C**	**B**	**A**

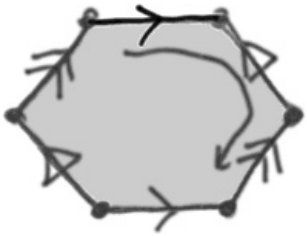
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





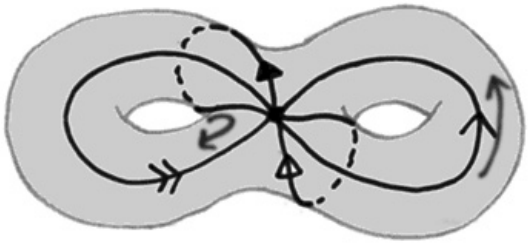
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

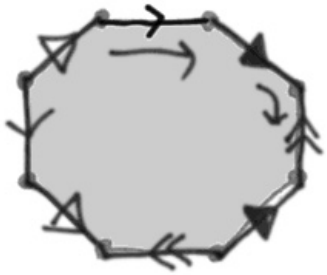
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

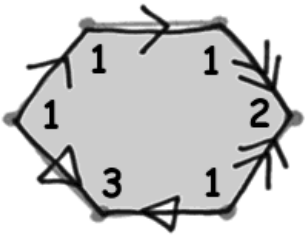
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





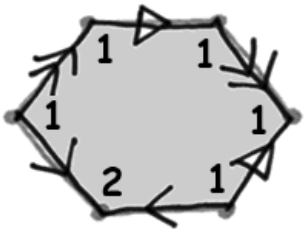
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 4 \\ +\ f & = \quad 1 \\ \hline \chi & = -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



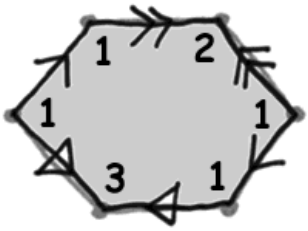
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



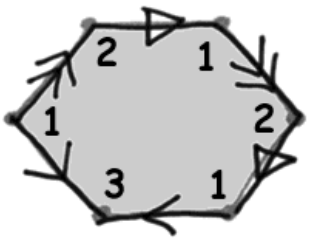
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



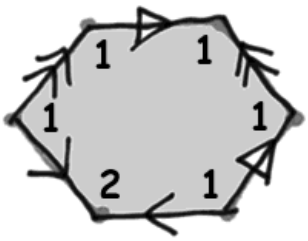
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



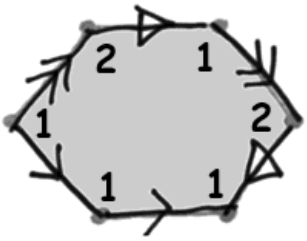
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



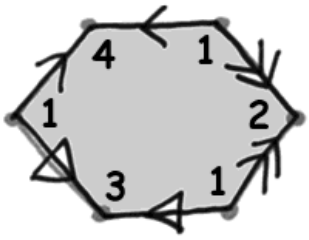
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

yes



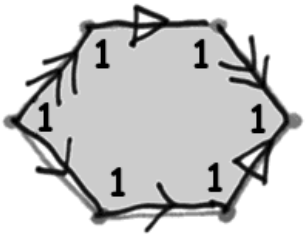
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



$$\begin{array}{rr} +\ v & = \quad 4 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 2 \end{array}$$

yes



$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

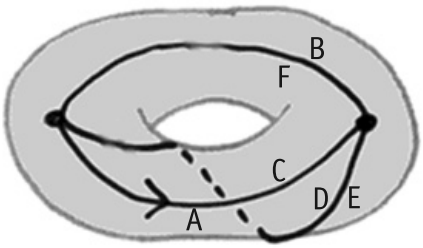
no

Practice First Exam AG

MATH V1011: Surfaces and Knots, Spring, 2003

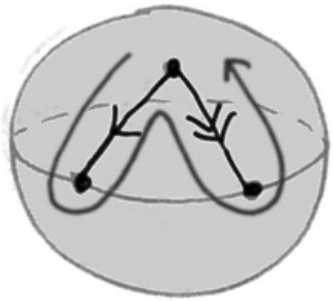
Answer Key

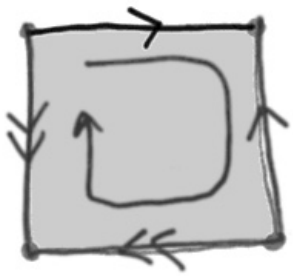
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**C**	**E**	**B**	**A**

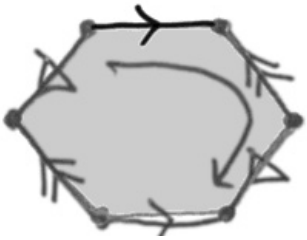
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





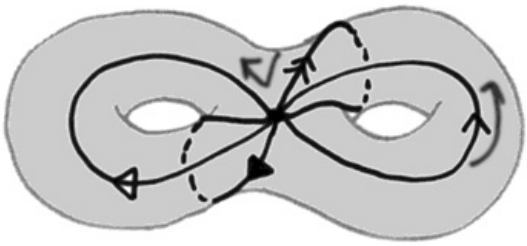
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

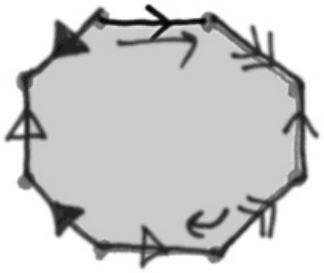
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

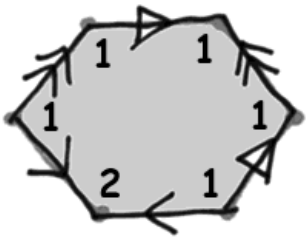
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





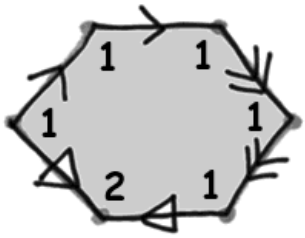
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



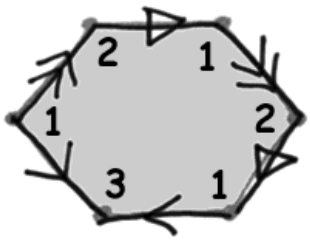
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



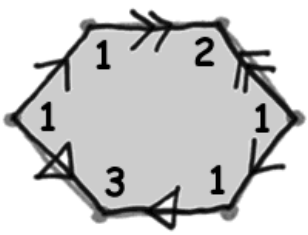
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



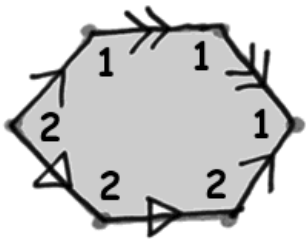
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



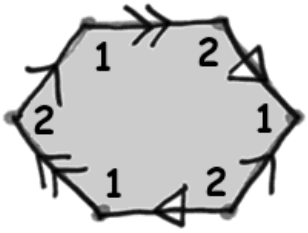
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



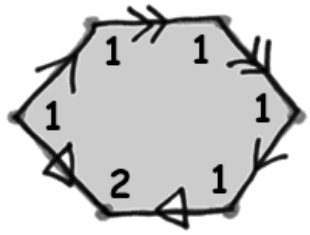
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



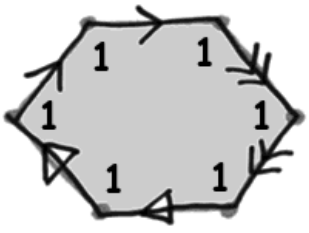
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

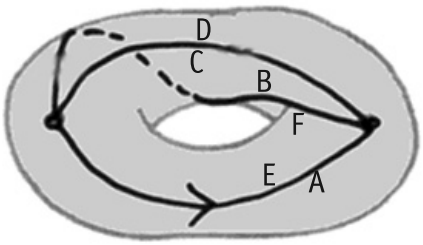
no

Practice First Exam AH

MATH V1011: Surfaces and Knots, Spring, 2003

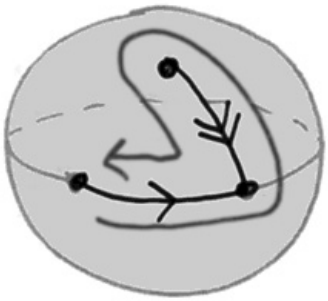
Answer Key

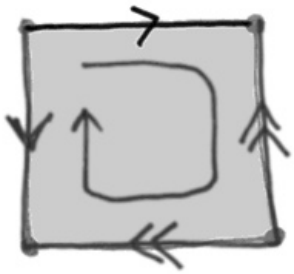
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**E**	**C**	**B**	**A**

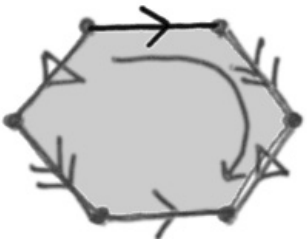
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





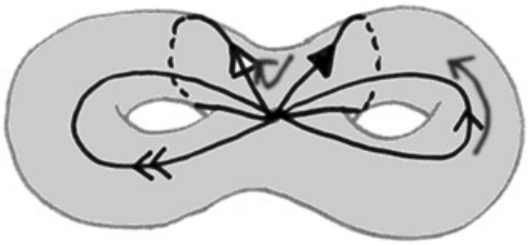
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

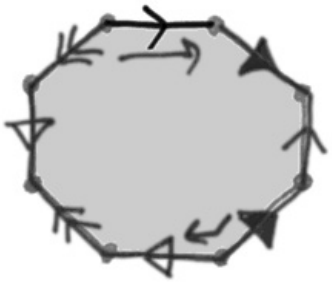
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

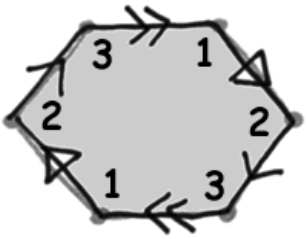
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





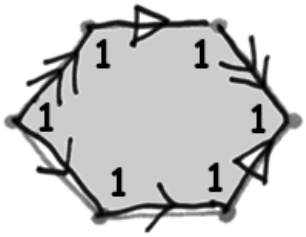
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



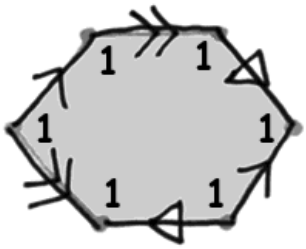
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



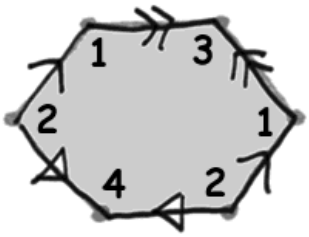
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



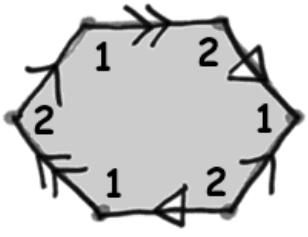
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



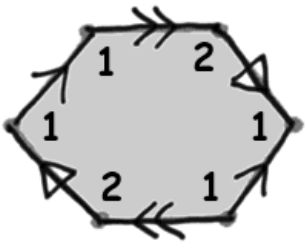
$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

yes



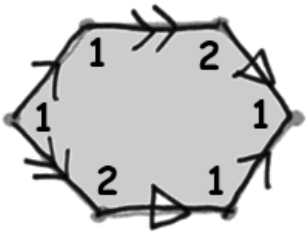
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



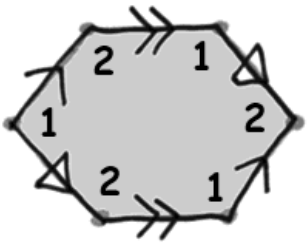
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

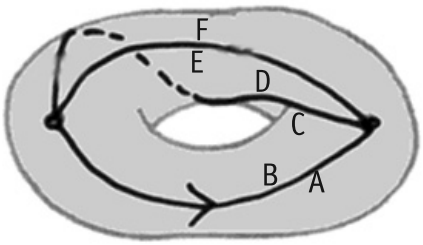
yes

Practice First Exam AI

MATH V1011: Surfaces and Knots, Spring, 2003

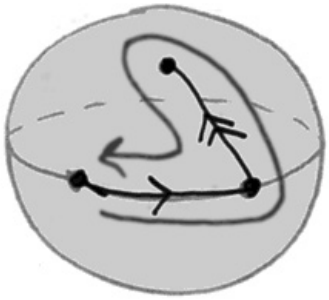
Answer Key

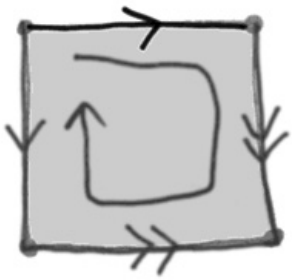
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**F**	**C**	**B**	**E**	**D**	**A**

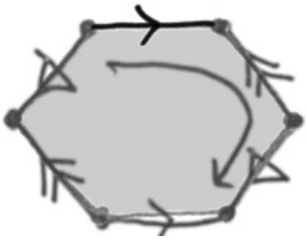
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





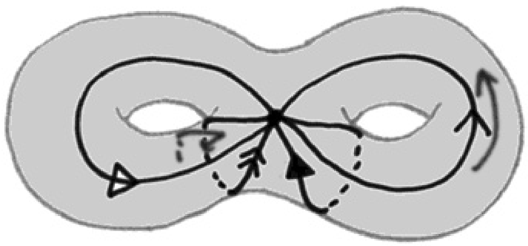
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

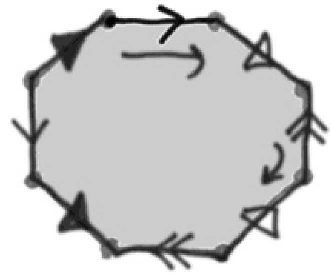
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

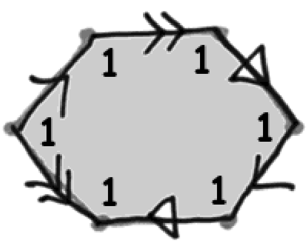
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



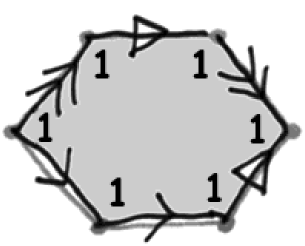


$+\,v = 1$
$-\,e = 4$
$+\,f = 1$
$\chi = -2$

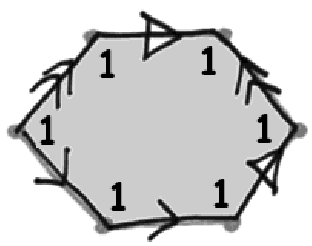
[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



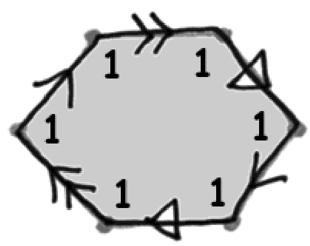
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



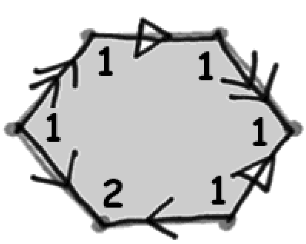
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



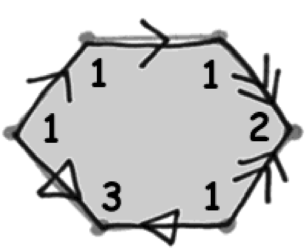
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



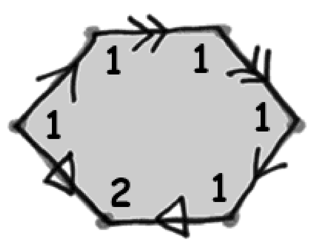
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



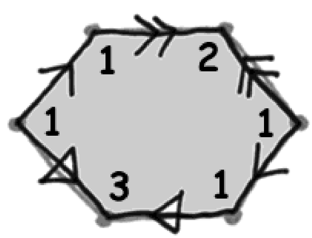
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$
no



$+\,v = 3$
$-\,e = 3$
$+\,f = 1$
$\chi = 1$
no



$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$
no



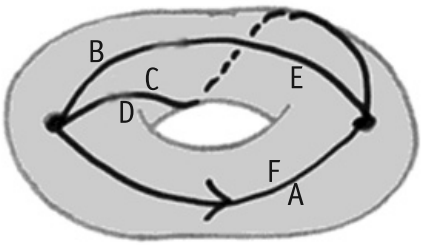
$+\,v = 3$
$-\,e = 3$
$+\,f = 1$
$\chi = 1$
no

Practice First Exam AJ

MATH V1011: Surfaces and Knots, Spring, 2003

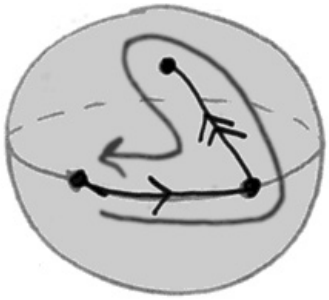
Answer Key

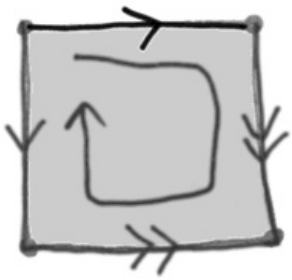
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**E**	**F**	**D**	**B**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



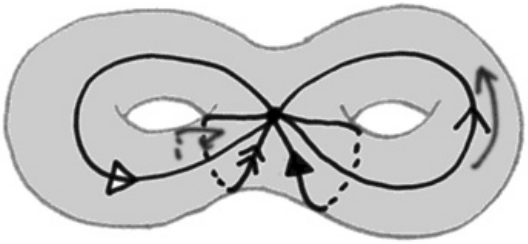


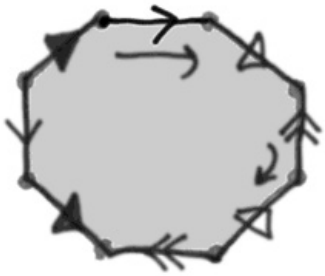
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

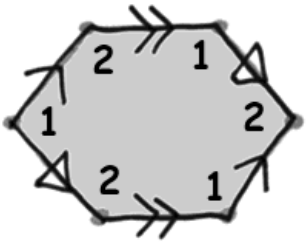
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





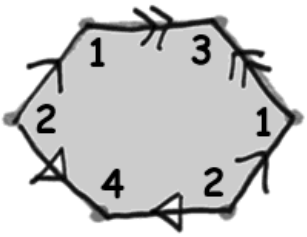
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



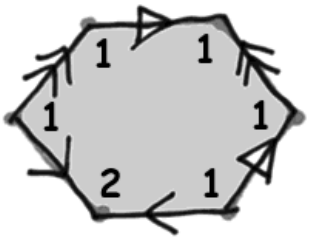
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



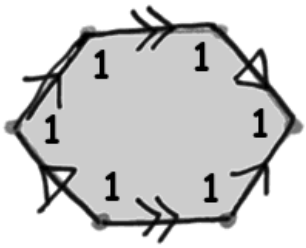
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



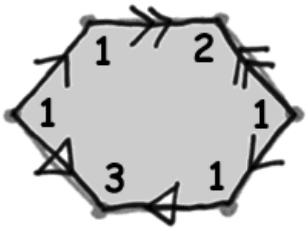
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



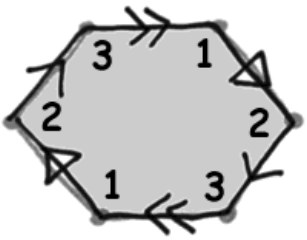
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



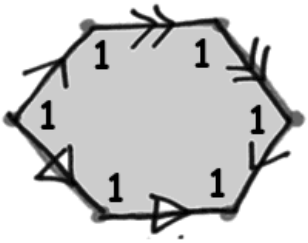
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



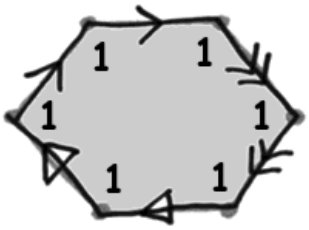
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

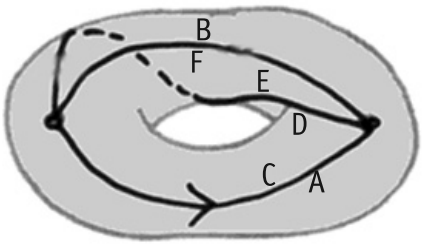
no

Practice First Exam AK

MATH V1011: Surfaces and Knots, Spring, 2003

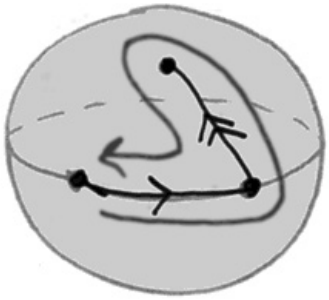
Answer Key

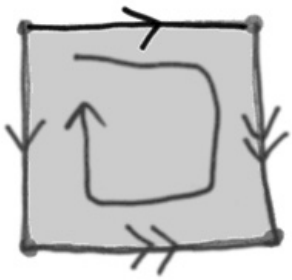
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**D**	**C**	**F**	**E**	**A**

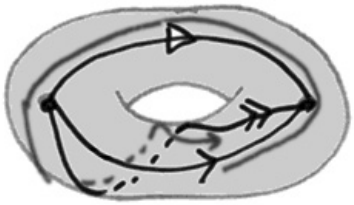
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

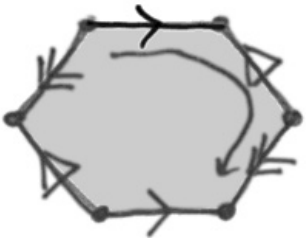




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

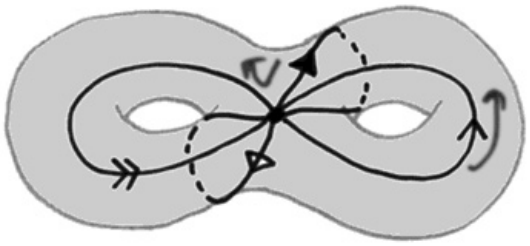
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

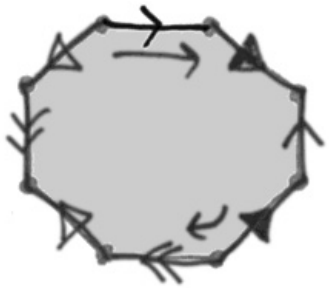




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

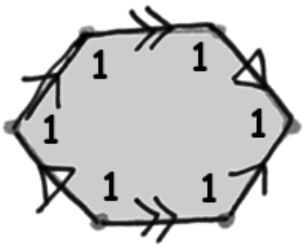
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





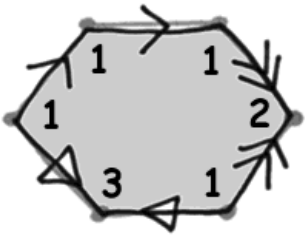
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



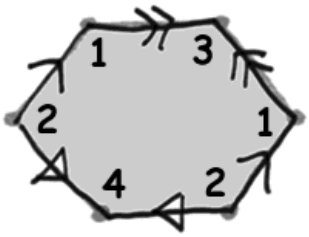
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



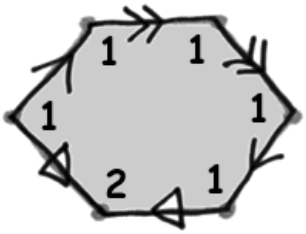
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



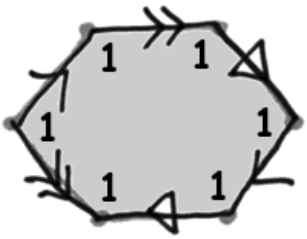
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



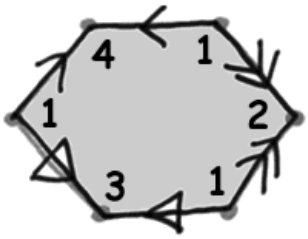
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



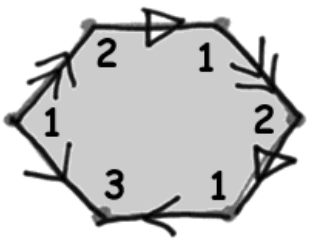
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



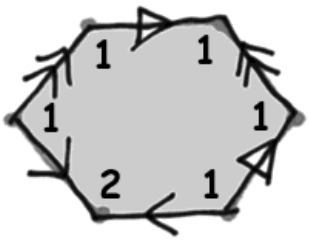
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

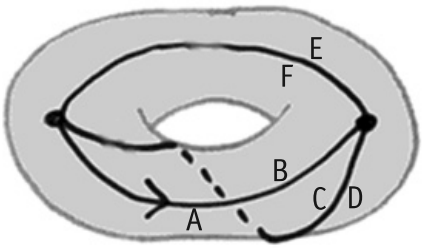
yes

Practice First Exam AL

MATH V1011: Surfaces and Knots, Spring, 2003

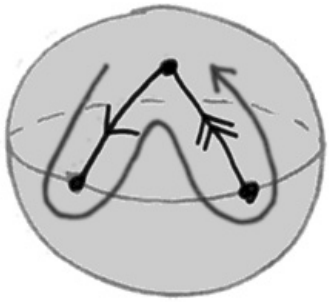
Answer Key

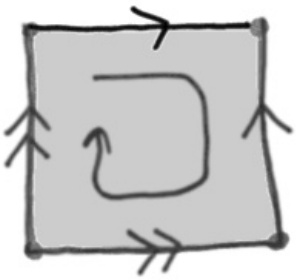
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**B**	**D**	**E**	**A**

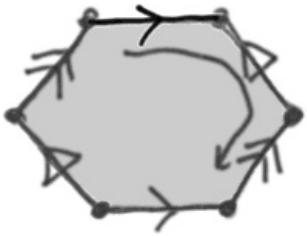
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





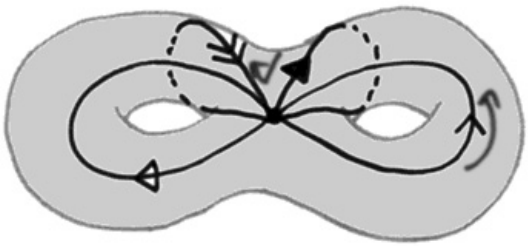
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

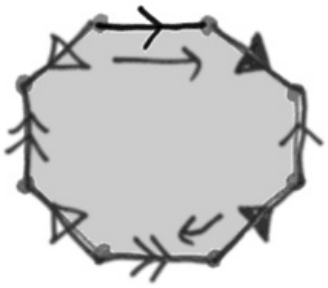
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

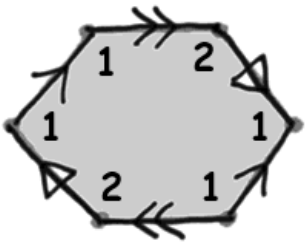
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





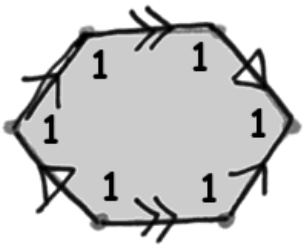
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



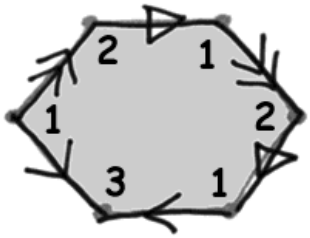
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



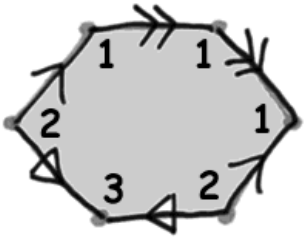
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



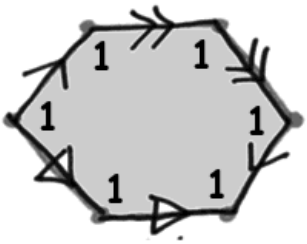
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



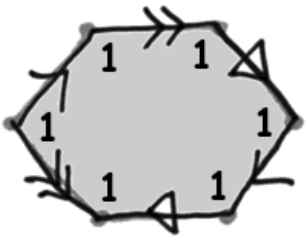
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



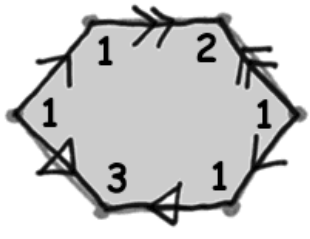
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



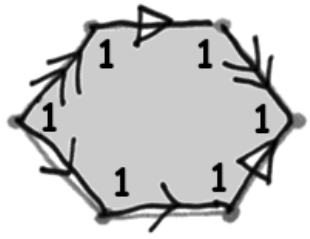
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

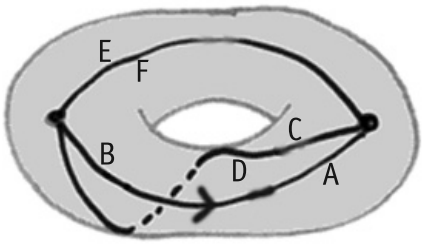
no

Practice First Exam AM

MATH V1011: Surfaces and Knots, Spring, 2003

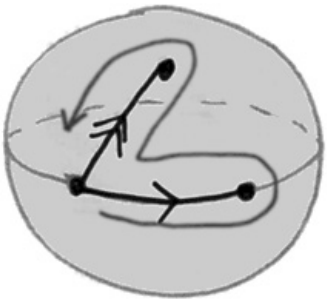
Answer Key

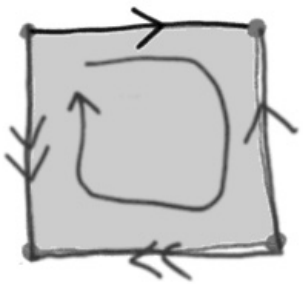
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**E**	**D**	**B**	**F**	**C**	**A**

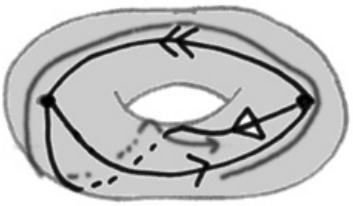
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

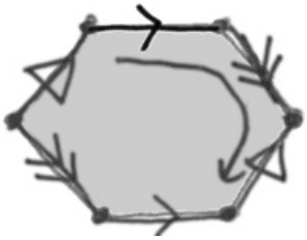




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

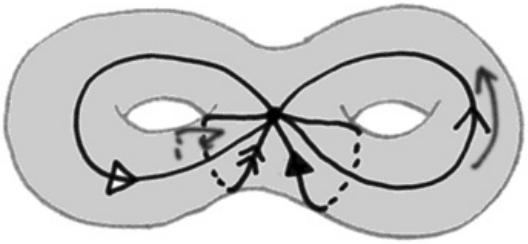
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

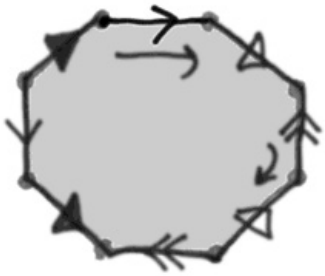




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

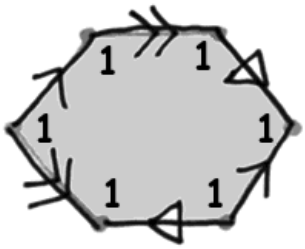
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





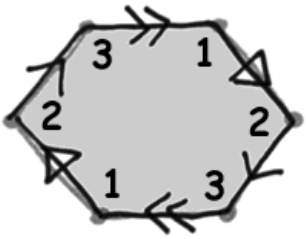
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



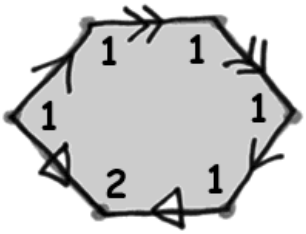
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



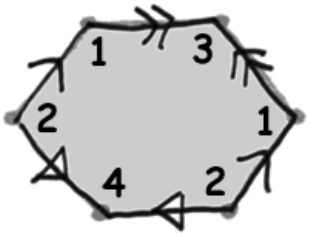
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



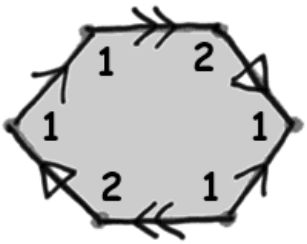
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



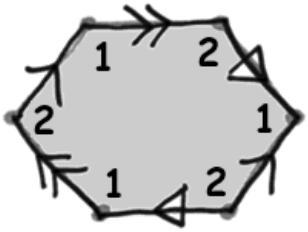
$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

yes



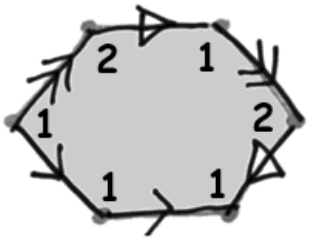
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



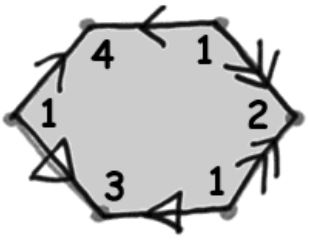
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

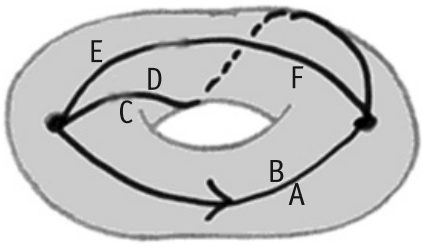
yes

Practice First Exam AN

MATH V1011: Surfaces and Knots, Spring, 2003

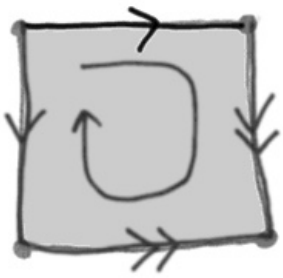
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



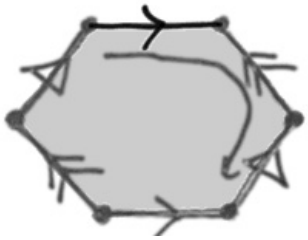
A	**D**	**F**	**B**	**C**	**E**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



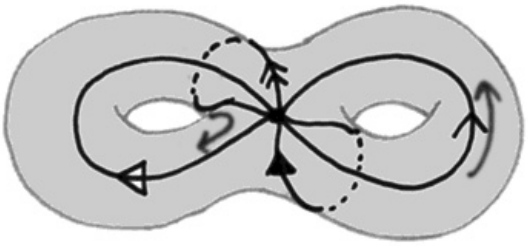
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

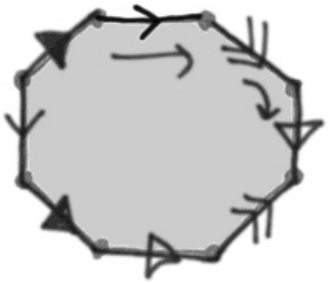
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

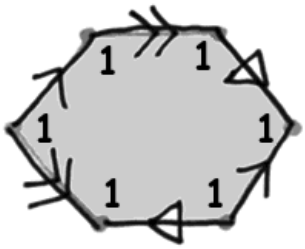
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





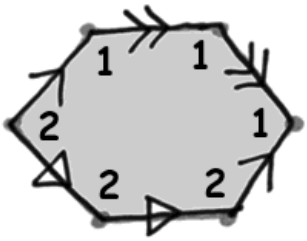
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



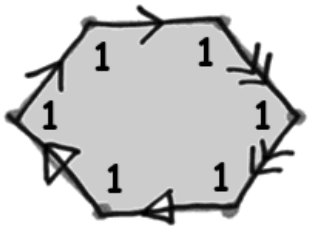
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



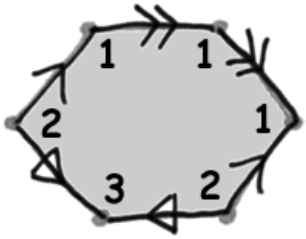
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



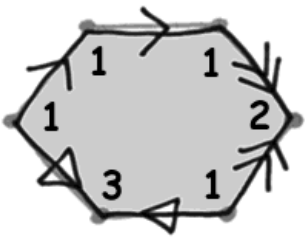
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



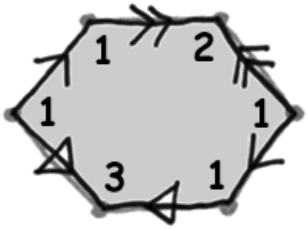
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



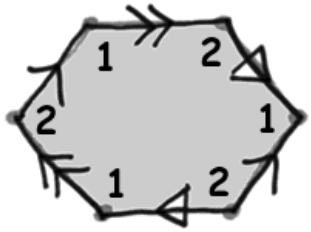
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



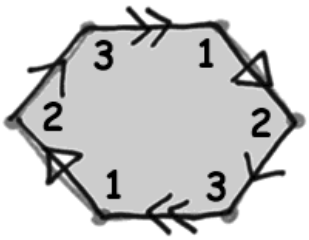
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

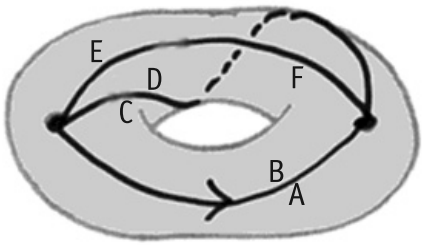
no

Practice First Exam BA

MATH V1011: Surfaces and Knots, Spring, 2003

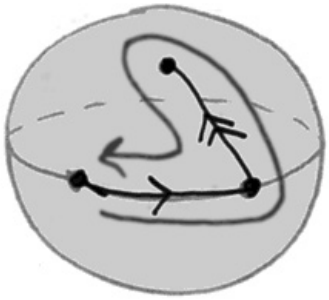
Answer Key

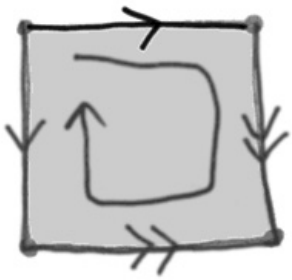
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**B**	**C**	**E**	**A**

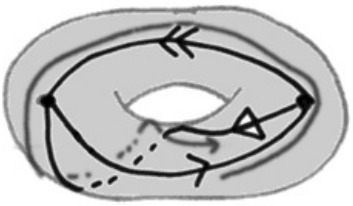
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

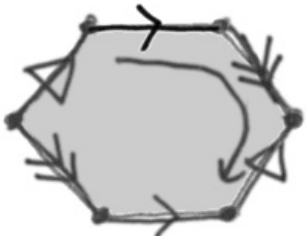




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

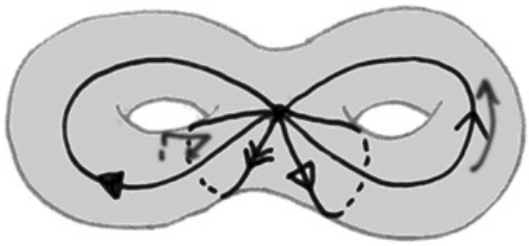
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

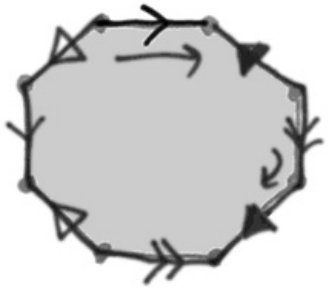




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

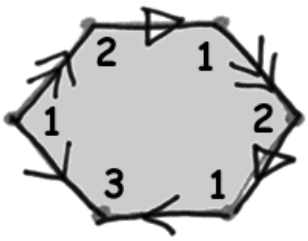
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





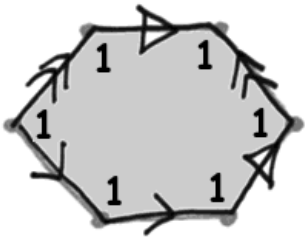
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 4 \\ +\ f & = \quad 1 \\ \hline \chi & = -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



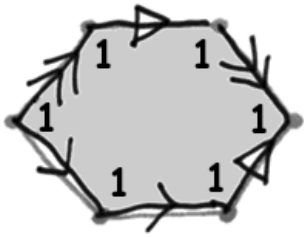
$$\begin{array}{rr} +\ v & = 3 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 1 \end{array}$$

no



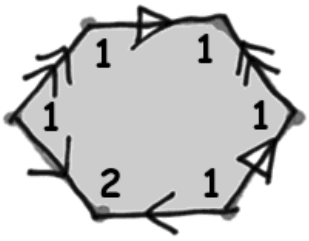
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

no



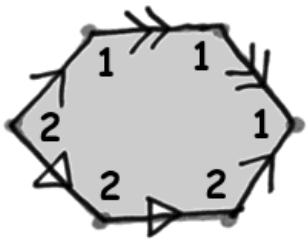
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

no



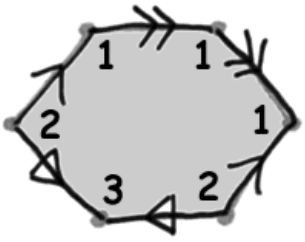
$$\begin{array}{rr} +\ v & = 2 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 0 \end{array}$$

yes



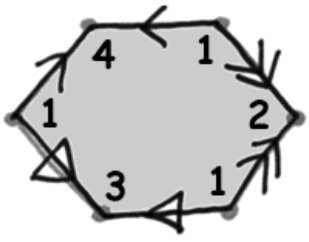
$$\begin{array}{rr} +\ v & = 2 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 0 \end{array}$$

no



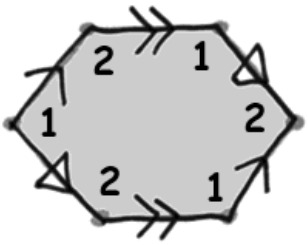
$$\begin{array}{rr} +\ v & = 3 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 1 \end{array}$$

no



$$\begin{array}{rr} +\ v & = 4 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 2 \end{array}$$

yes



$$\begin{array}{rr} +\ v & = 2 \\ -\ e & = 3 \\ +\ f & = 1 \\ \hline \chi & = 0 \end{array}$$

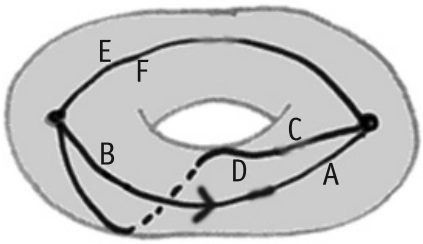
yes

Practice First Exam BB

MATH V1011: Surfaces and Knots, Spring, 2003

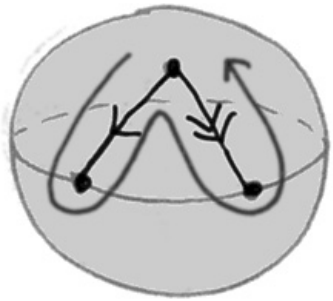
Answer Key

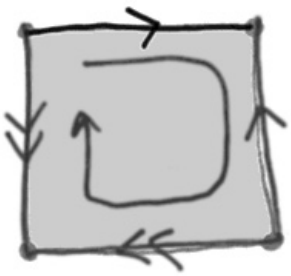
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**E**	**D**	**B**	**F**	**C**	**A**

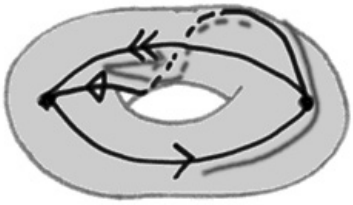
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

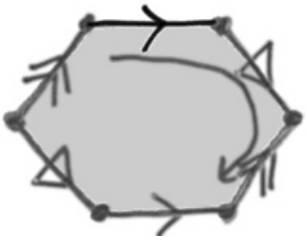




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

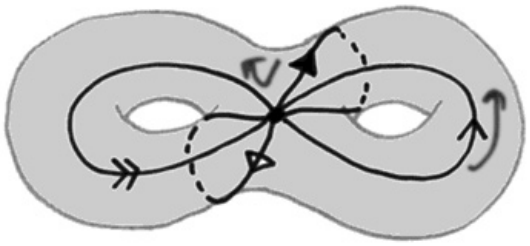
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

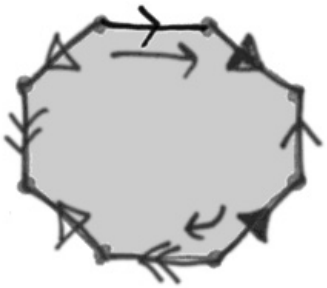




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

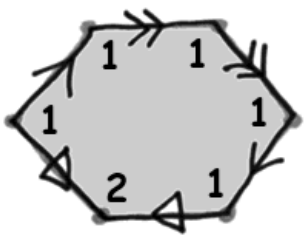
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





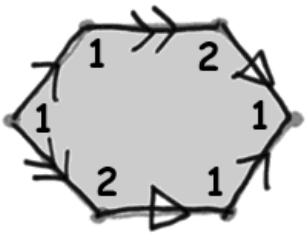
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



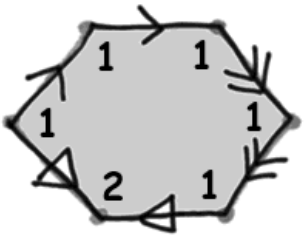
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



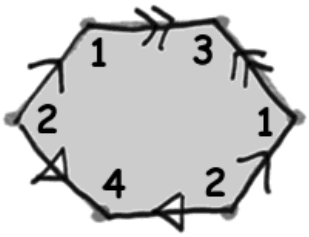
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



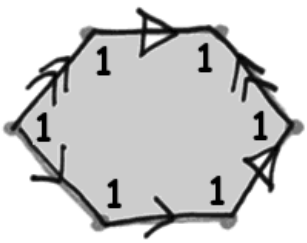
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



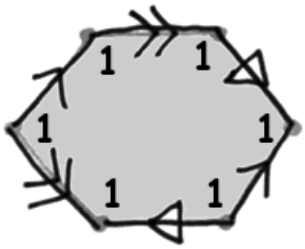
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



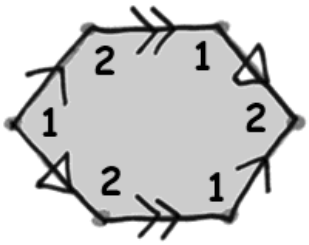
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



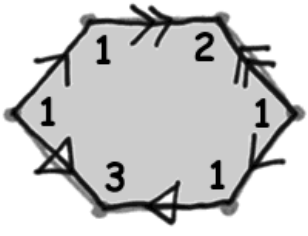
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

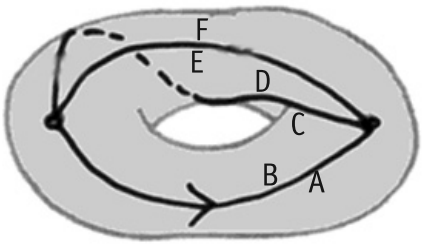
no

Practice First Exam BC

MATH V1011: Surfaces and Knots, Spring, 2003

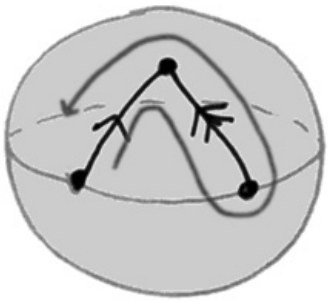
Answer Key

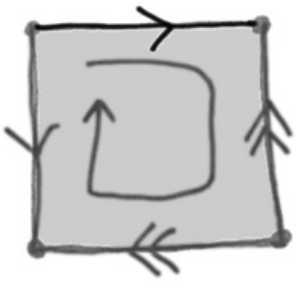
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**F**	**C**	**B**	**E**	**D**	**A**

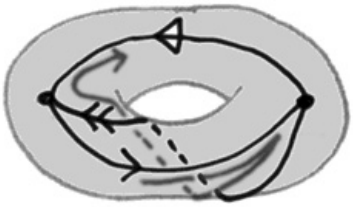
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

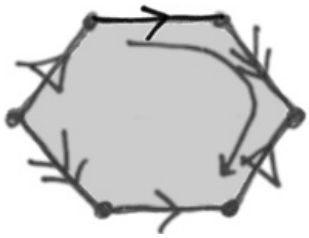




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

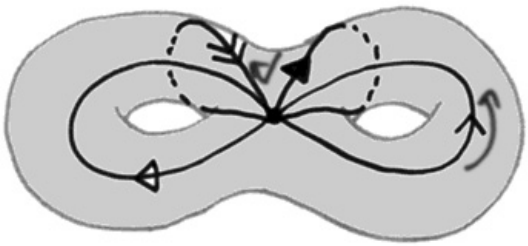
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

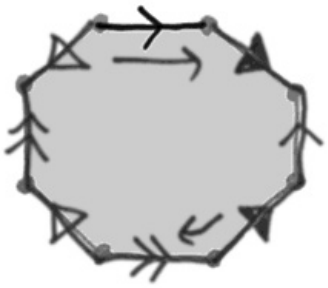




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

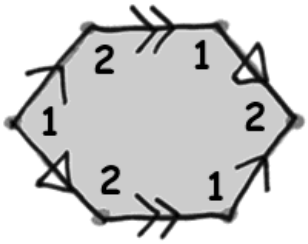
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





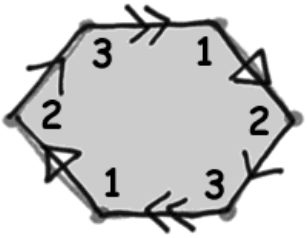
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



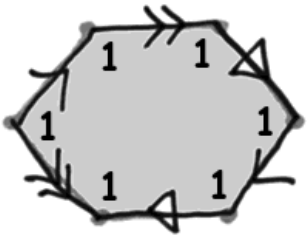
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



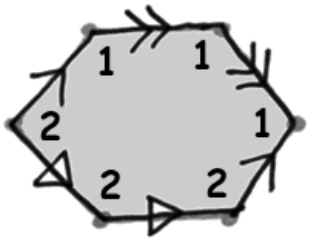
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



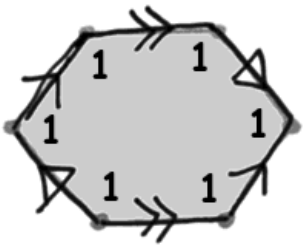
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



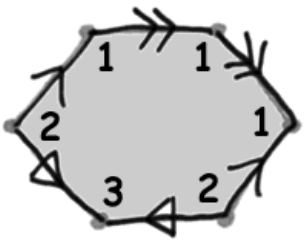
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



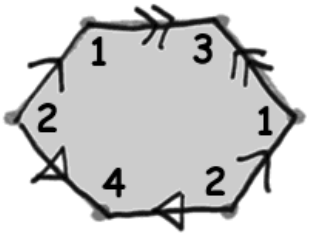
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



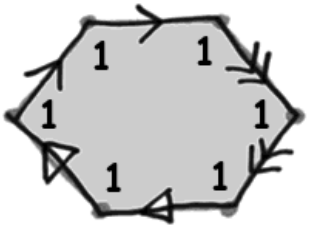
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

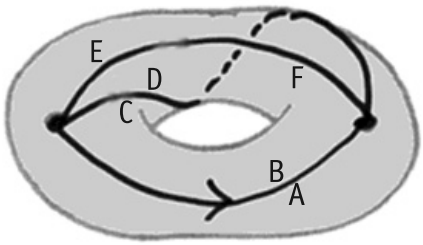
no

Practice First Exam BD

MATH V1011: Surfaces and Knots, Spring, 2003

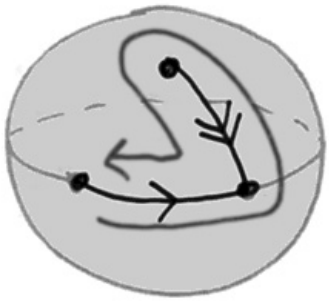
Answer Key

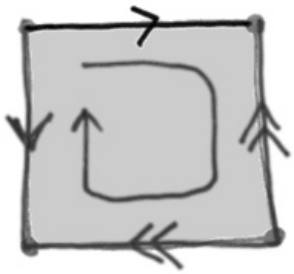
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**B**	**C**	**E**	**A**

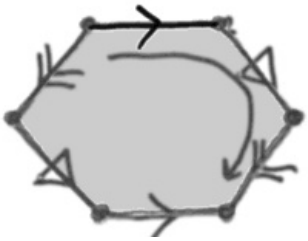
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





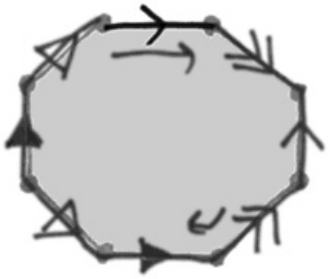
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



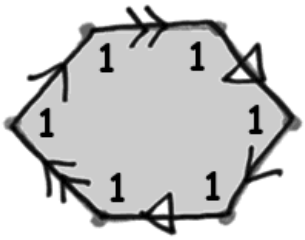
$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



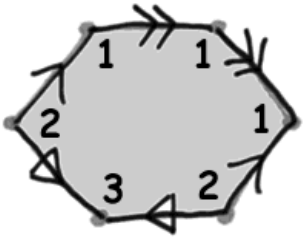
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



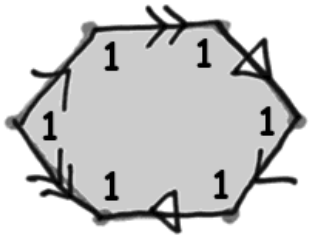
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



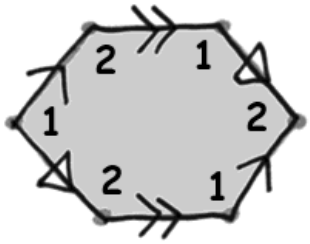
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



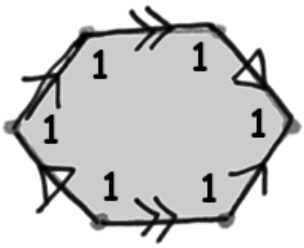
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



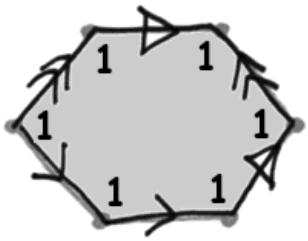
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



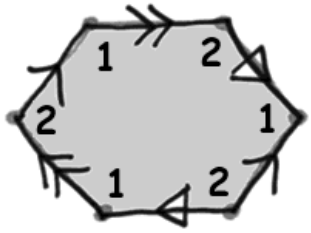
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



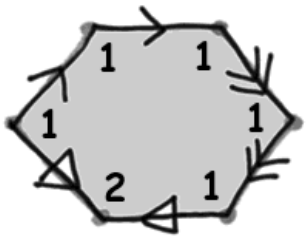
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

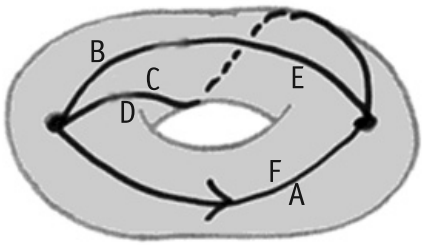
no

Practice First Exam BE

MATH V1011: Surfaces and Knots, Spring, 2003

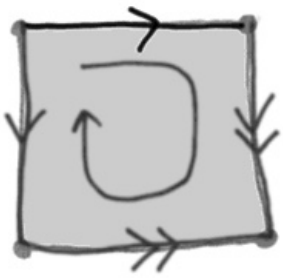
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



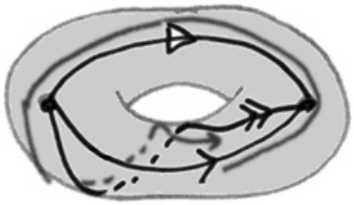
A	**C**	**E**	**F**	**D**	**B**	**A**

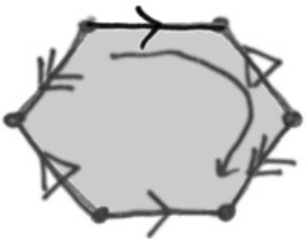
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

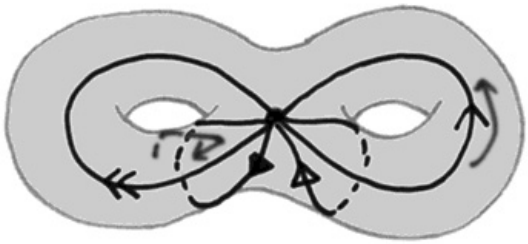
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

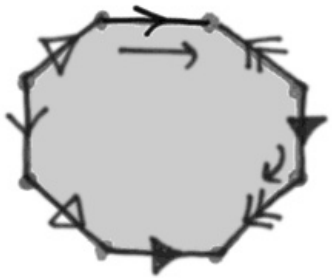




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

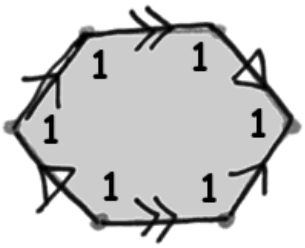
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





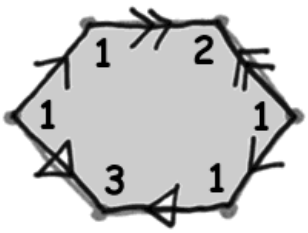
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



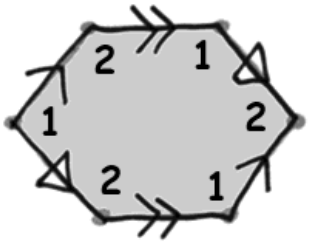
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



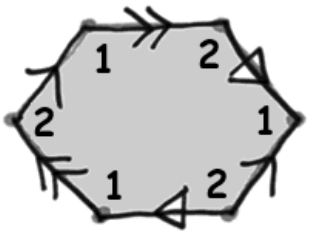
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



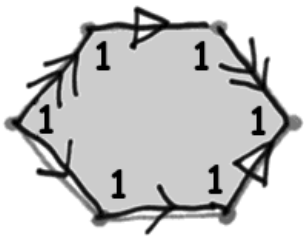
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



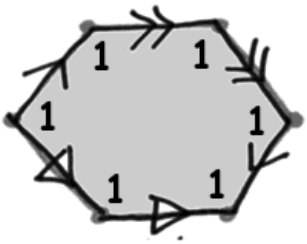
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



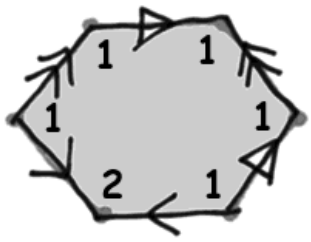
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



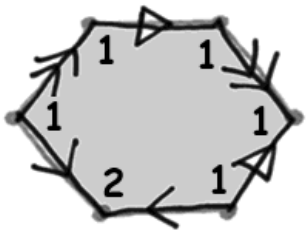
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

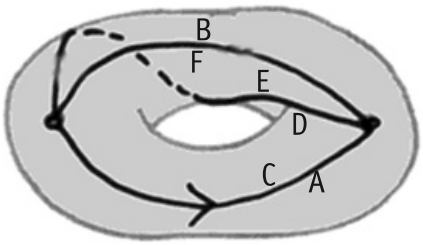
no

Practice First Exam BF

MATH V1011: Surfaces and Knots, Spring, 2003

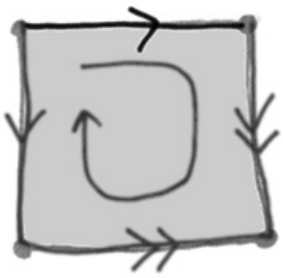
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



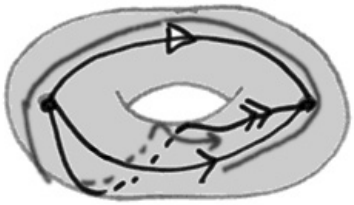
A	**B**	**D**	**C**	**F**	**E**	**A**

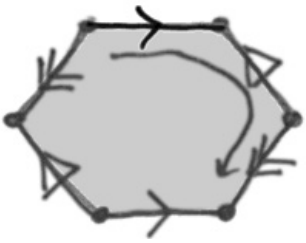
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

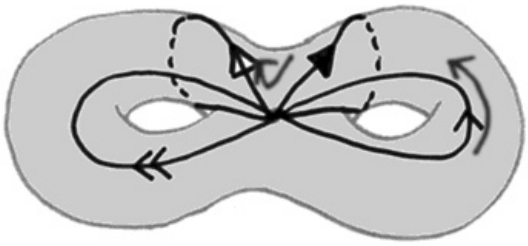
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

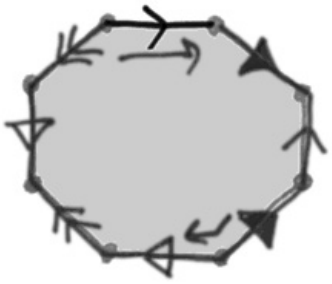




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

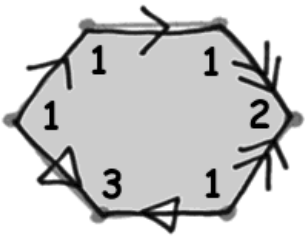
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





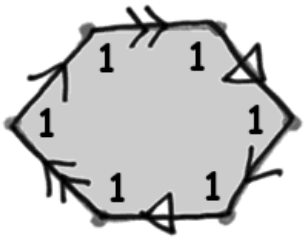
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



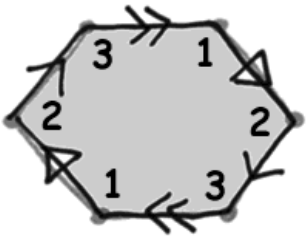
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



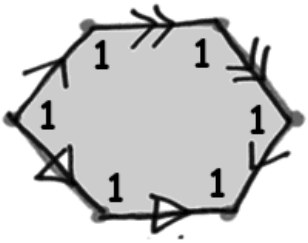
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



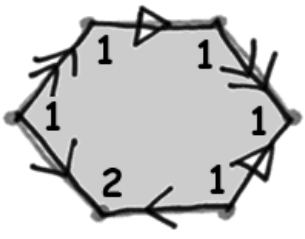
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



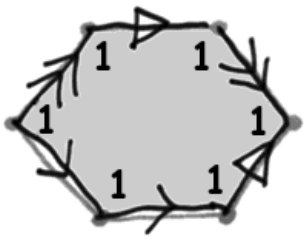
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



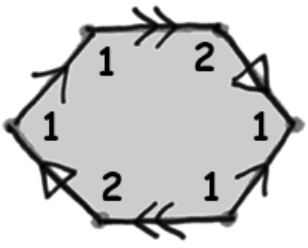
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



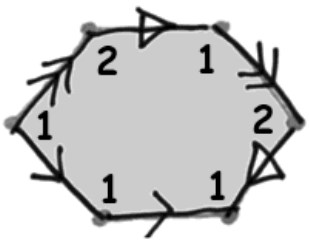
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

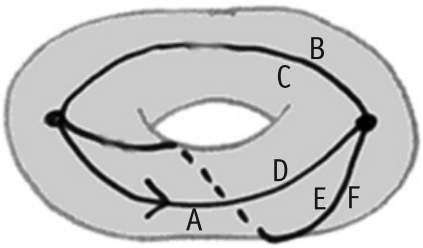
no

Practice First Exam BG

MATH V1011: Surfaces and Knots, Spring, 2003

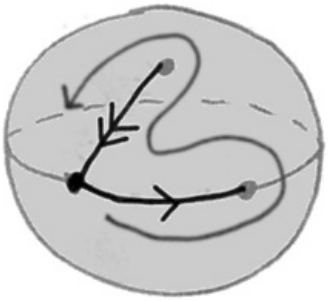
Answer Key

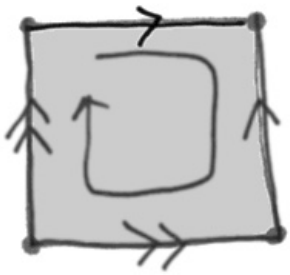
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**E**	**C**	**D**	**F**	**B**	**A**

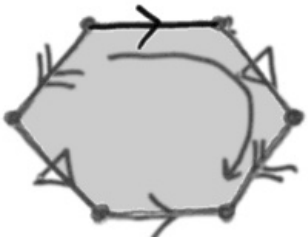
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





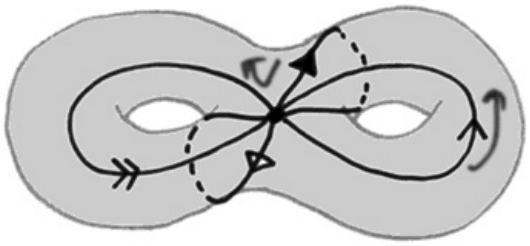
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

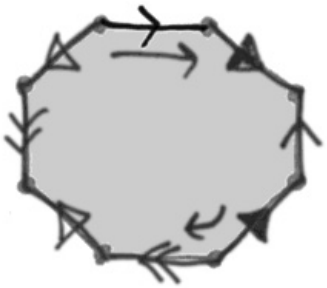
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

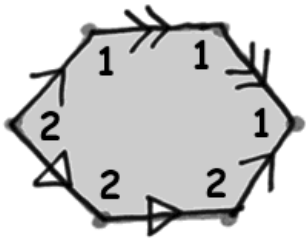
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





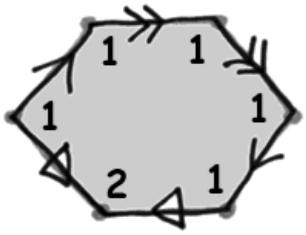
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 4 \\ +\ f & = \quad 1 \\ \hline \chi & = -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



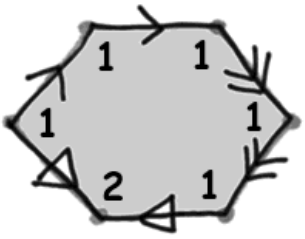
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



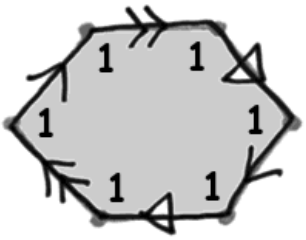
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



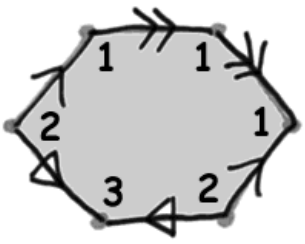
$$\begin{array}{rr} +\ v & = \quad 2 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 0 \end{array}$$

no



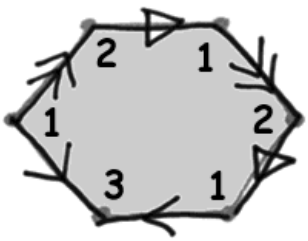
$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

no



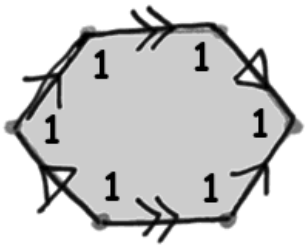
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



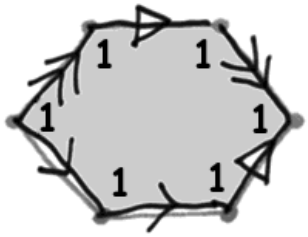
$$\begin{array}{rr} +\ v & = \quad 3 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = \quad 1 \end{array}$$

no



$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

no



$$\begin{array}{rr} +\ v & = \quad 1 \\ -\ e & = \quad 3 \\ +\ f & = \quad 1 \\ \hline \chi & = -1 \end{array}$$

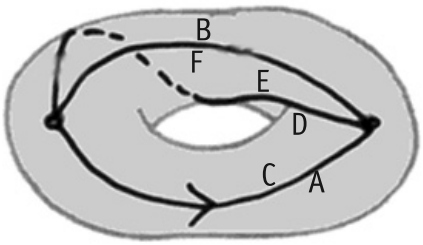
no

Practice First Exam BH

MATH V1011: Surfaces and Knots, Spring, 2003

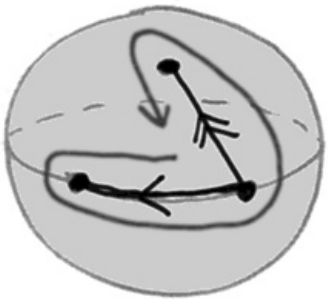
Answer Key

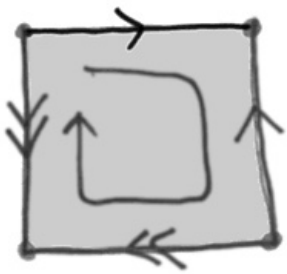
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**D**	**C**	**F**	**E**	**A**

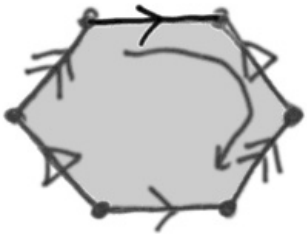
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





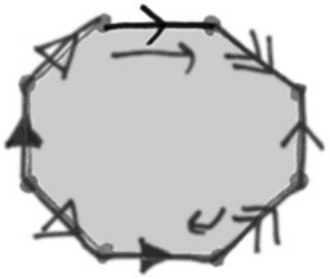
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



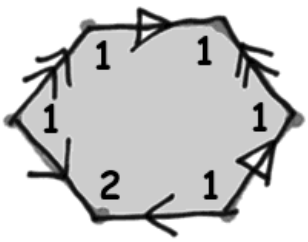
$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



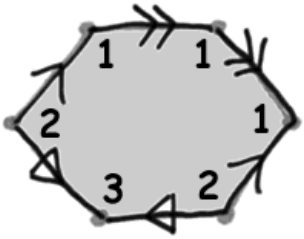
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



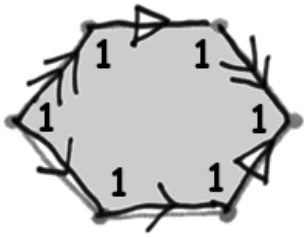
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



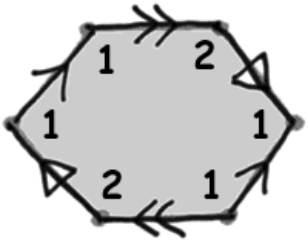
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



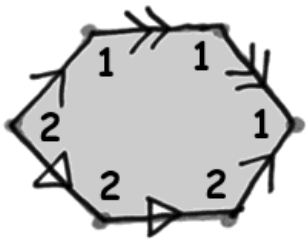
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



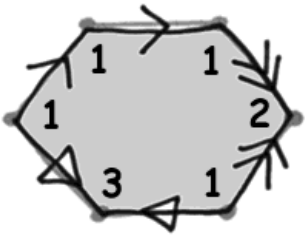
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



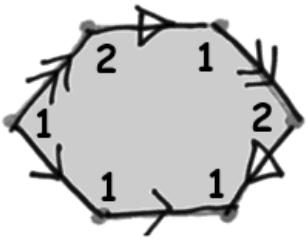
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



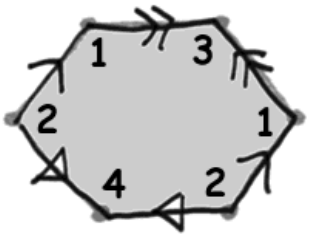
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

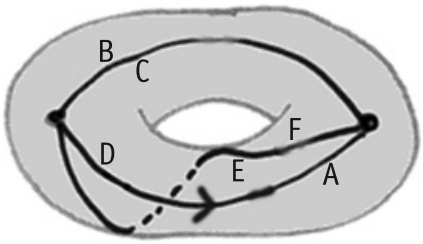
yes

Practice First Exam BI

MATH V1011: Surfaces and Knots, Spring, 2003

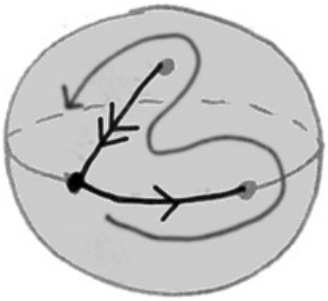
Answer Key

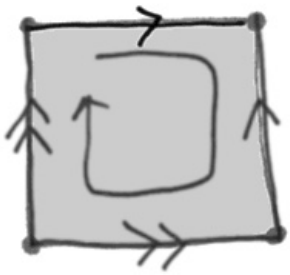
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**D**	**C**	**F**	**A**

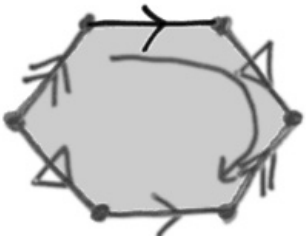
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





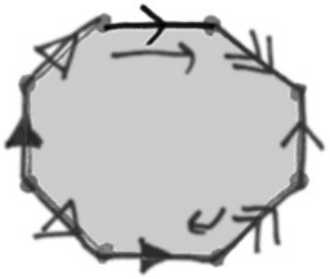
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



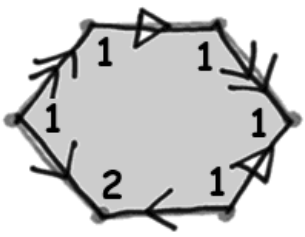
$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



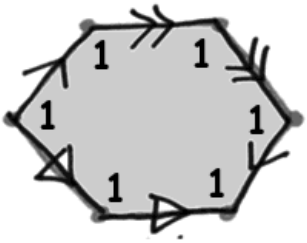
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



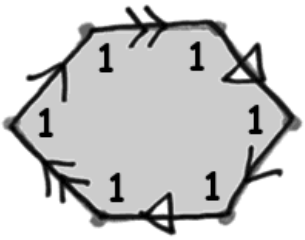
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



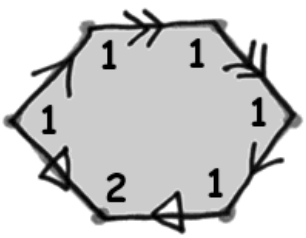
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



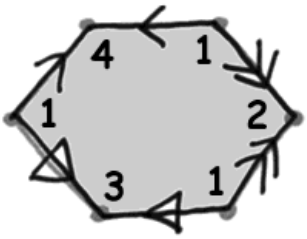
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



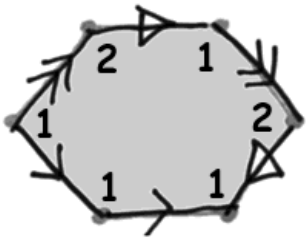
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



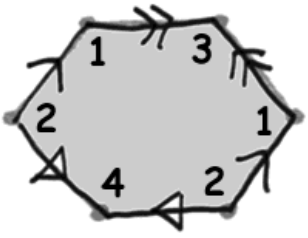
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



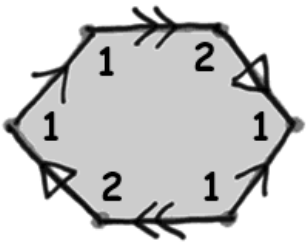
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

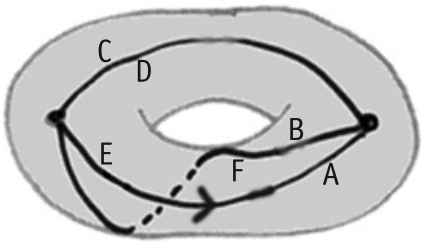
no

Practice First Exam BJ

MATH V1011: Surfaces and Knots, Spring, 2003

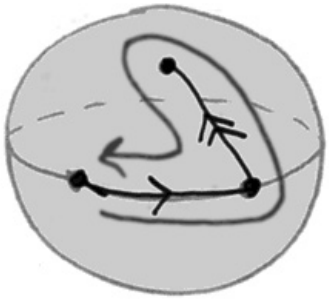
Answer Key

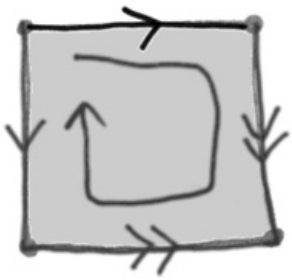
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**E**	**D**	**B**	**A**

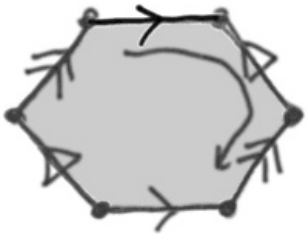
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





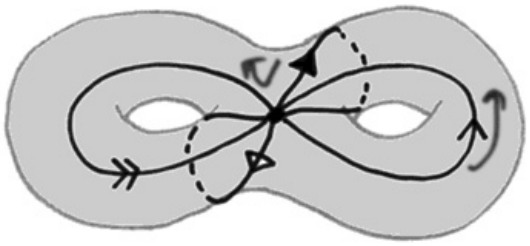
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

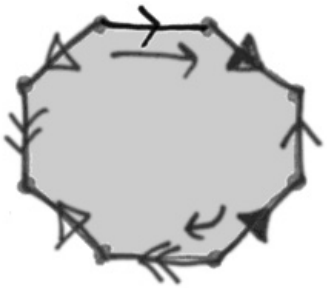
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

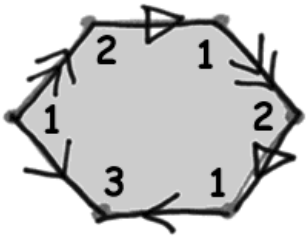
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





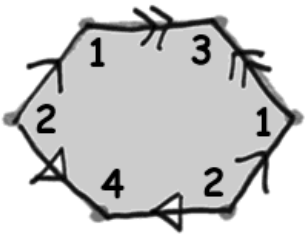
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



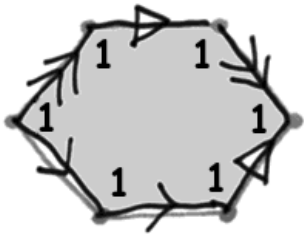
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



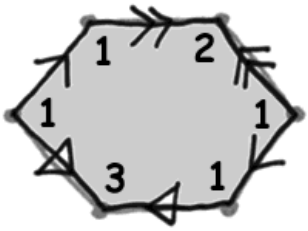
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



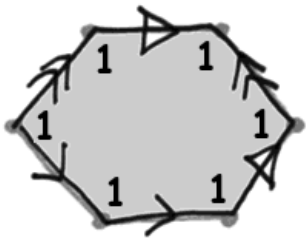
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



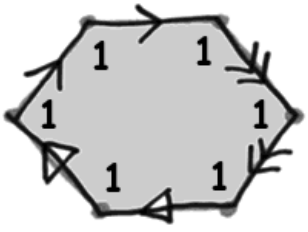
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



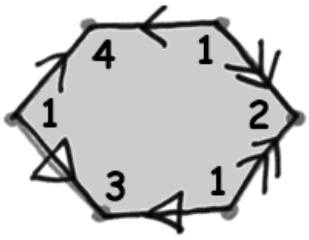
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



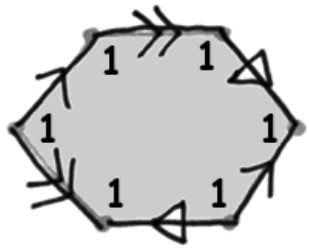
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

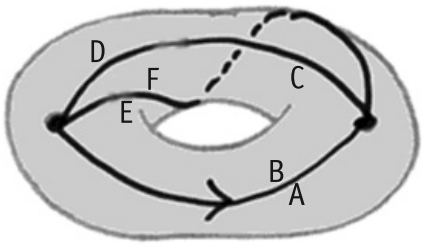
no

Practice First Exam BK

MATH V1011: Surfaces and Knots, Spring, 2003

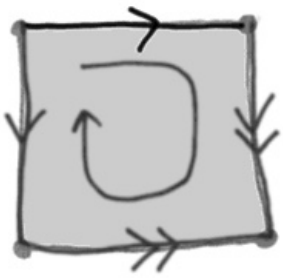
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



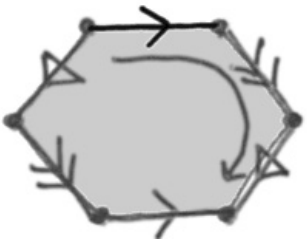
A	**F**	**C**	**B**	**E**	**D**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



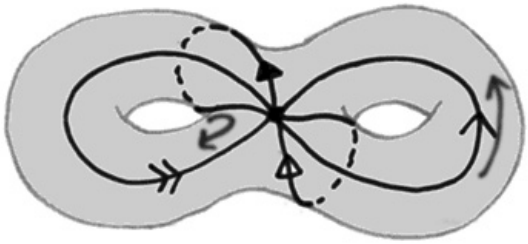
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

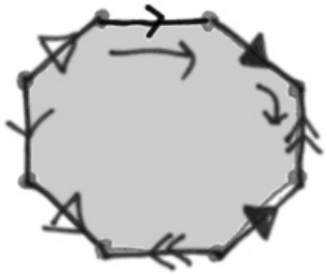
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

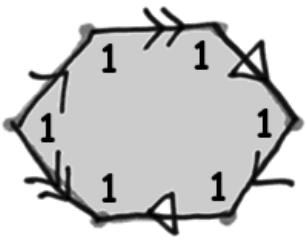
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





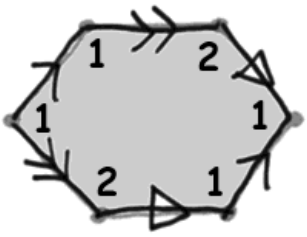
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



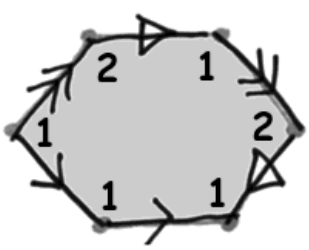
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



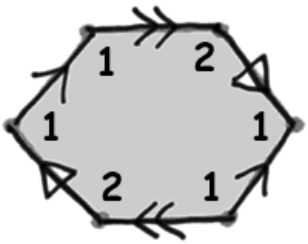
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



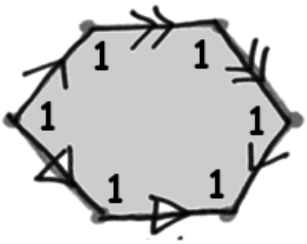
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



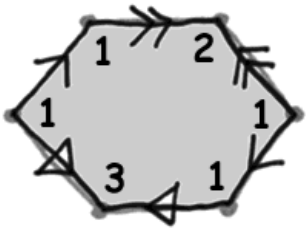
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



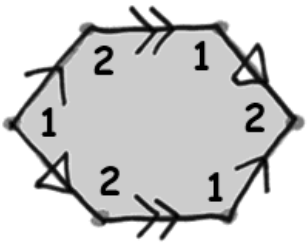
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



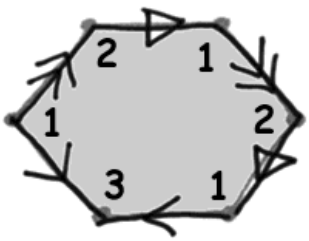
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

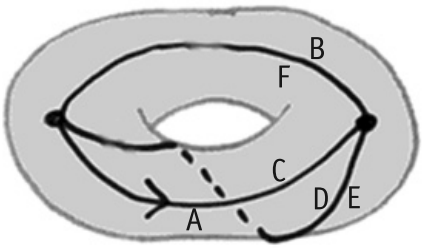
no

Practice First Exam BL

MATH V1011: Surfaces and Knots, Spring, 2003

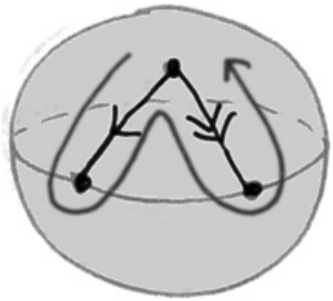
Answer Key

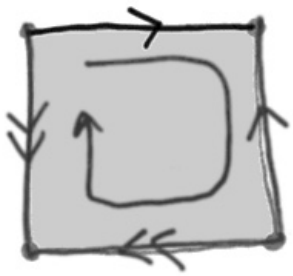
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**C**	**E**	**B**	**A**

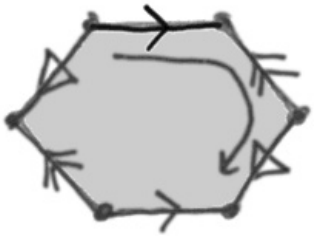
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





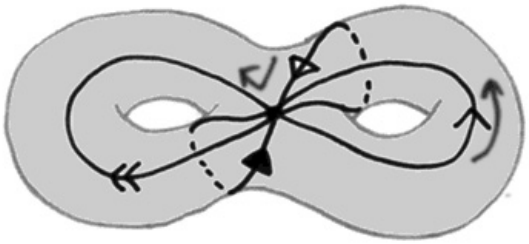
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

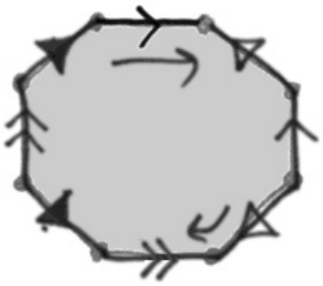
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

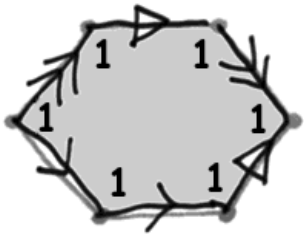
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





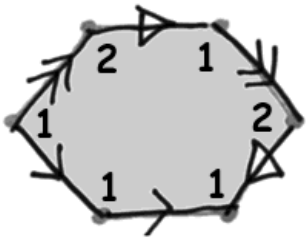
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



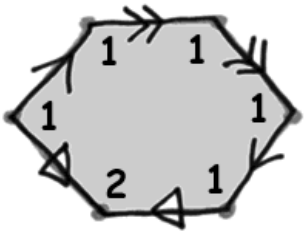
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



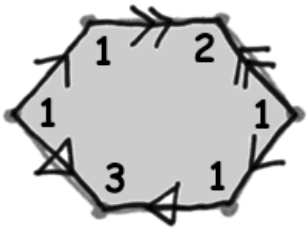
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



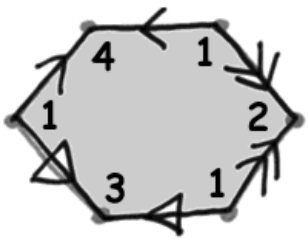
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



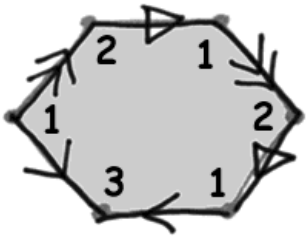
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



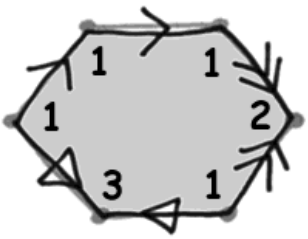
$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

yes



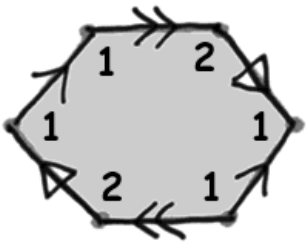
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

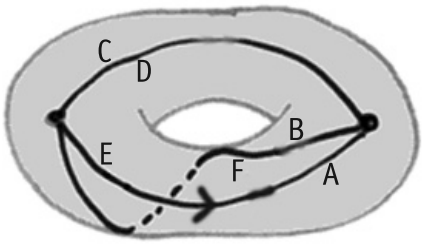
no

Practice First Exam BM

MATH V1011: Surfaces and Knots, Spring, 2003

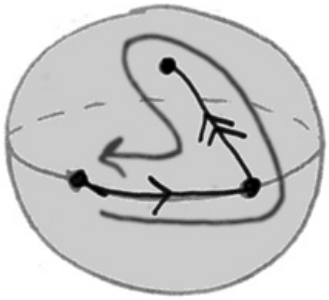
Answer Key

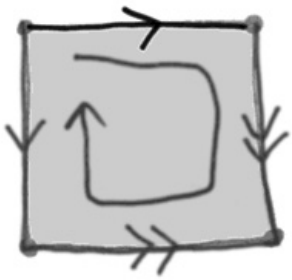
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**E**	**D**	**B**	**A**

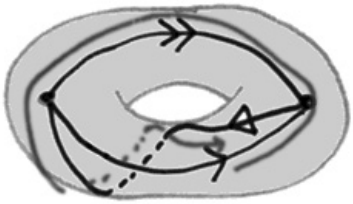
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

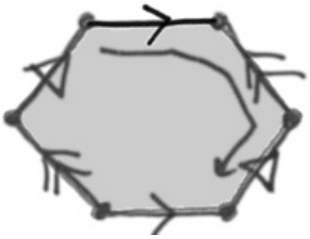




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

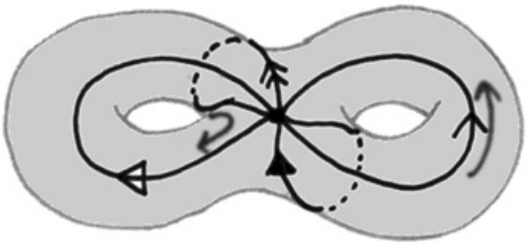
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

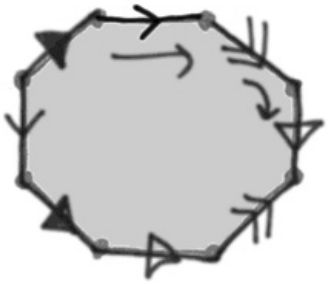




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

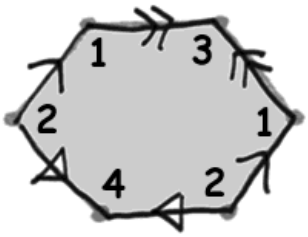
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





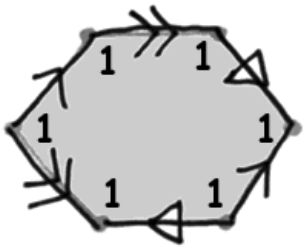
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



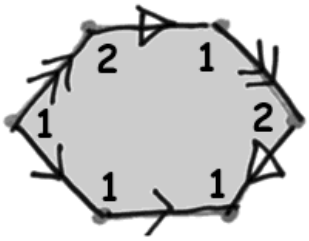
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



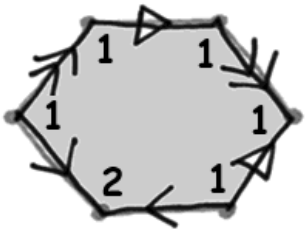
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



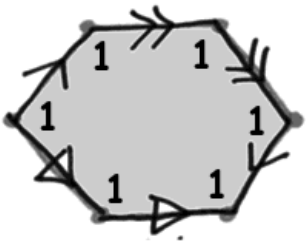
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



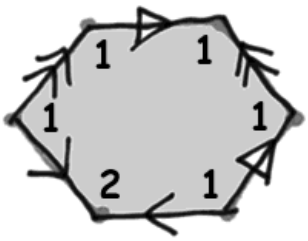
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



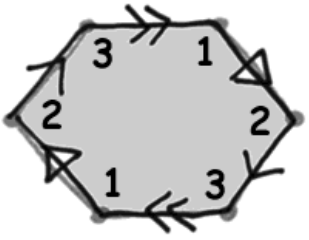
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



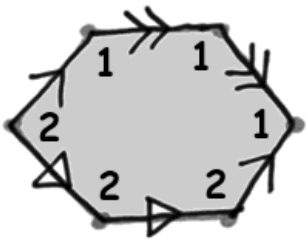
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

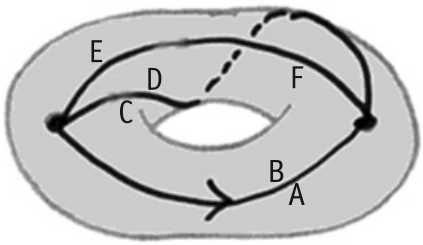
no

Practice First Exam BN

MATH V1011: Surfaces and Knots, Spring, 2003

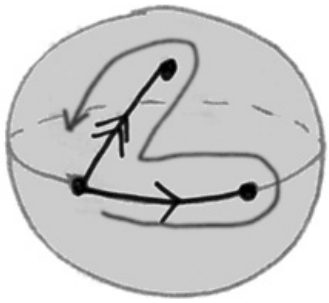
Answer Key

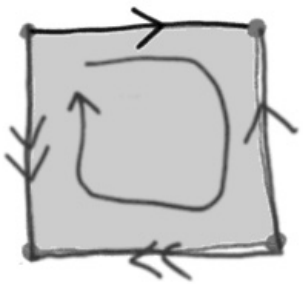
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**B**	**C**	**E**	**A**

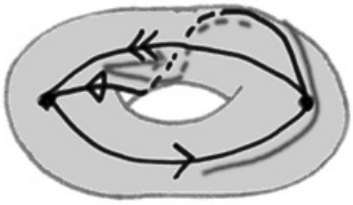
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

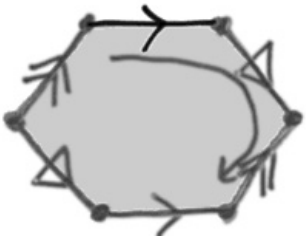




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

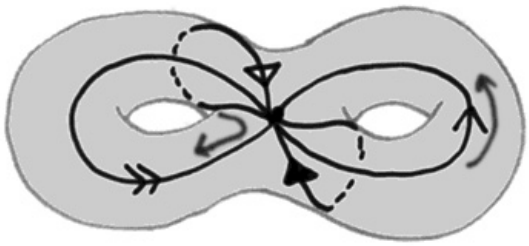
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

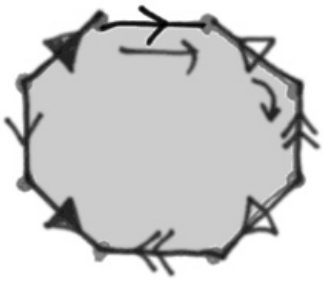




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

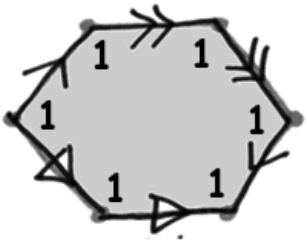
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





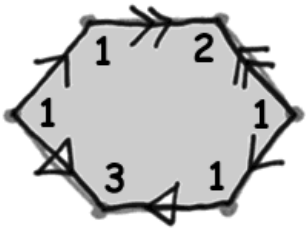
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



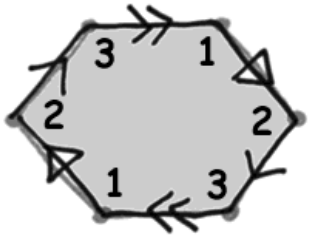
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



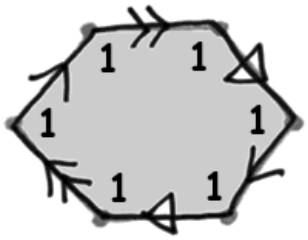
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



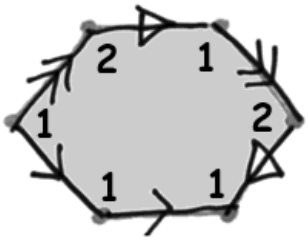
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



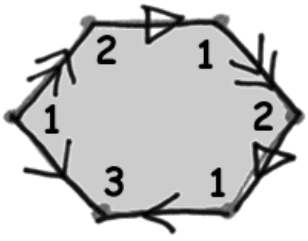
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



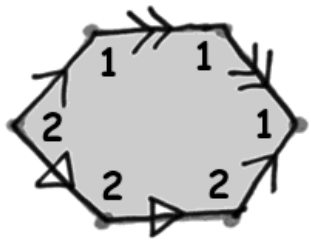
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



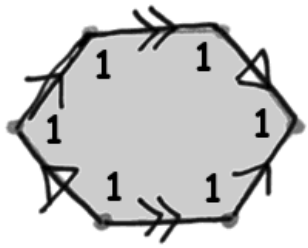
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

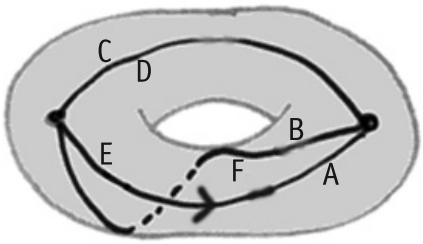
no

Practice First Exam CA

MATH V1011: Surfaces and Knots, Spring, 2003

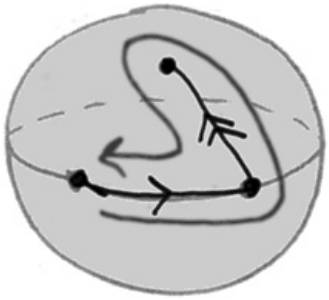
Answer Key

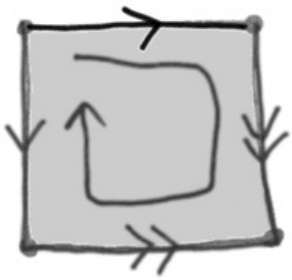
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**E**	**D**	**B**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



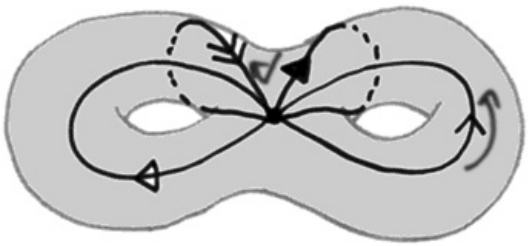


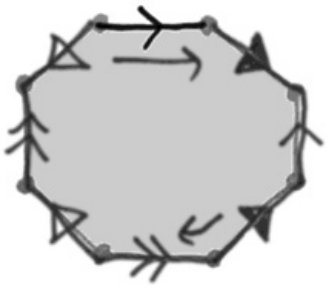
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

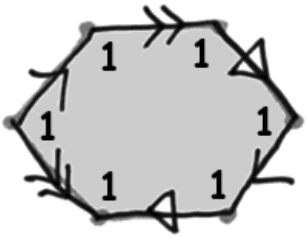
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





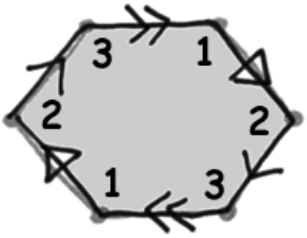
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



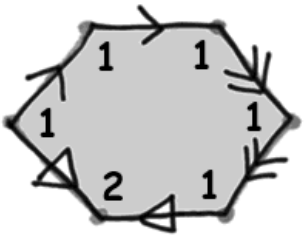
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



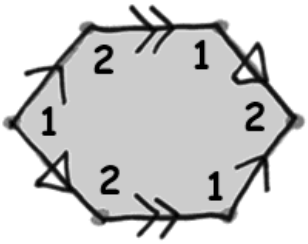
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



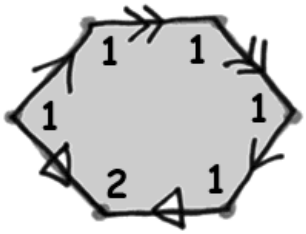
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



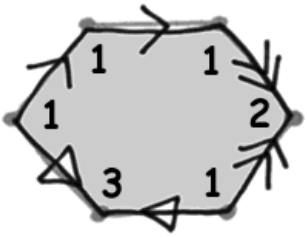
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



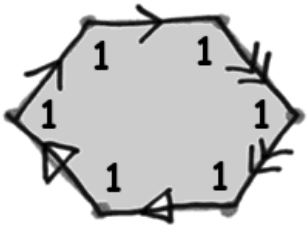
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



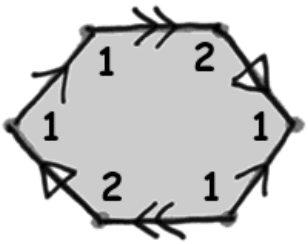
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

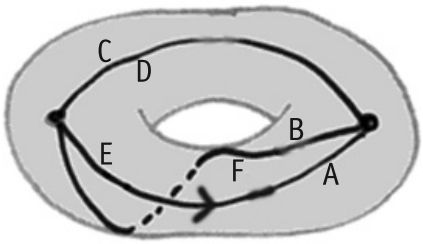
no

Practice First Exam CB

MATH V1011: Surfaces and Knots, Spring, 2003

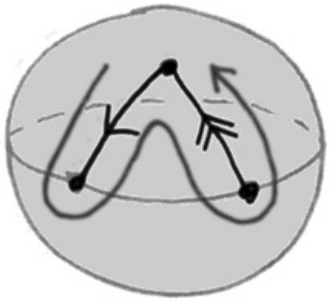
Answer Key

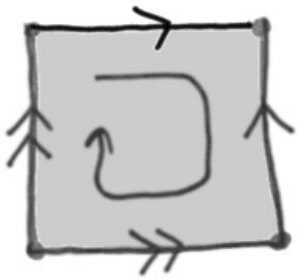
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**F**	**E**	**D**	**B**	**A**

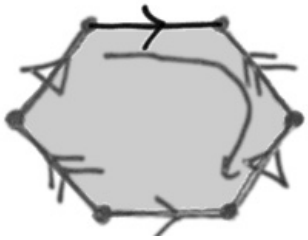
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





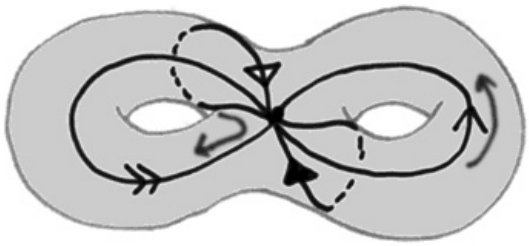
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

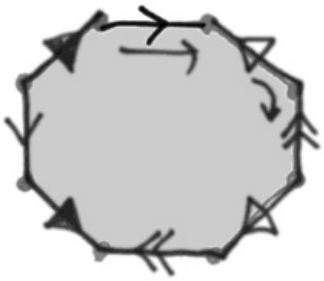
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

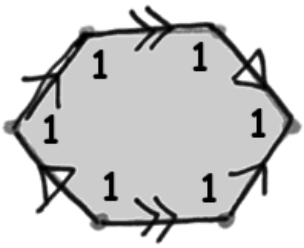
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





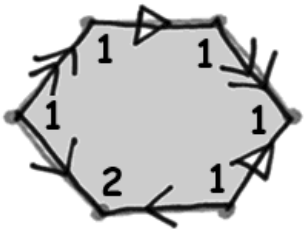
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



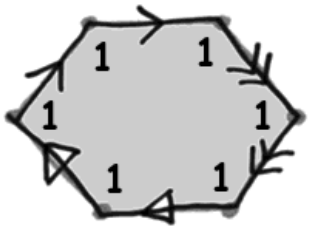
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



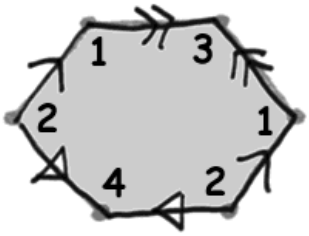
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



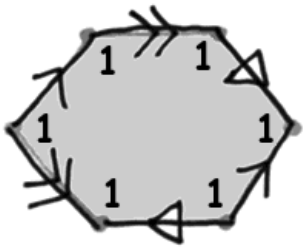
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



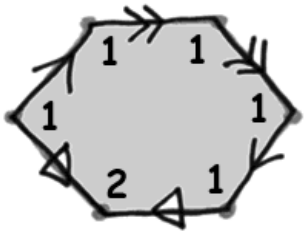
$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

yes



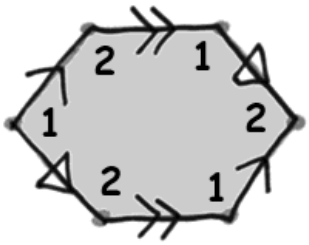
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



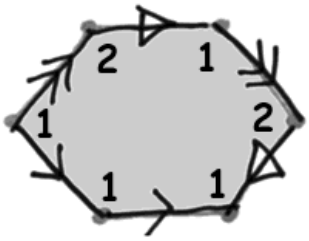
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

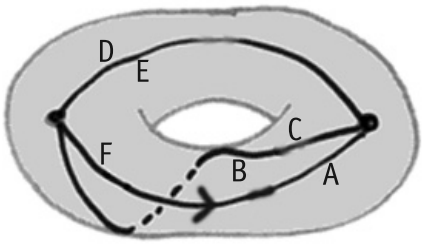
no

Practice First Exam CC

MATH V1011: Surfaces and Knots, Spring, 2003

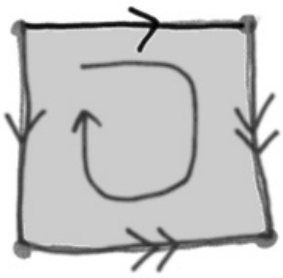
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



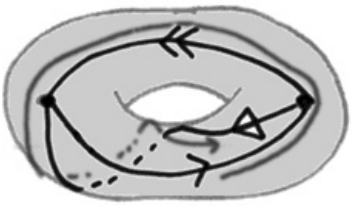
A	**D**	**B**	**F**	**E**	**C**	**A**

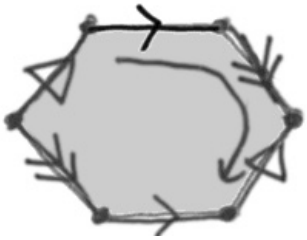
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

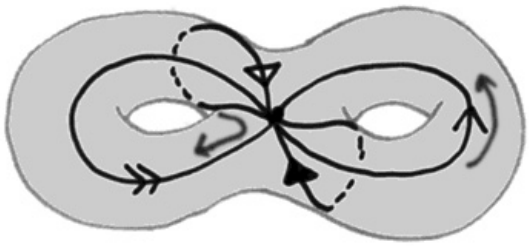
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

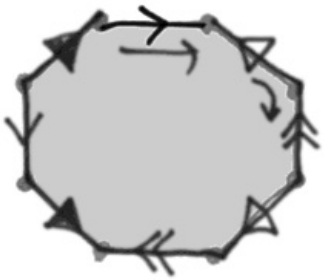




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

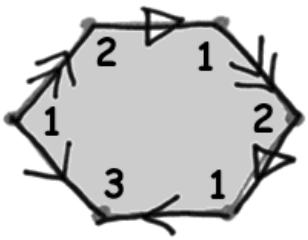
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





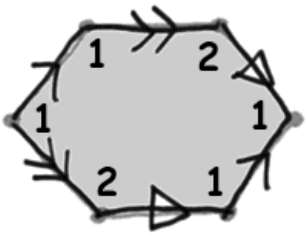
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



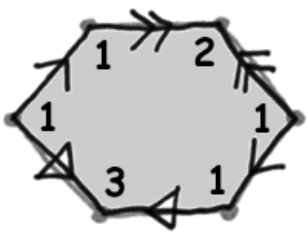
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



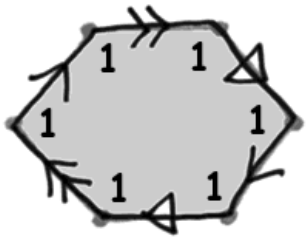
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



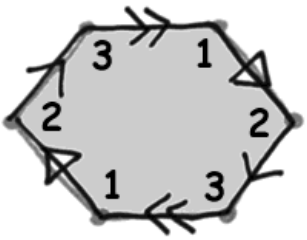
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



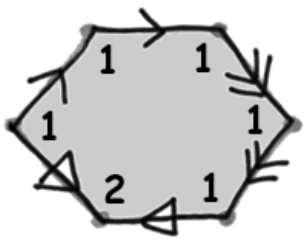
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



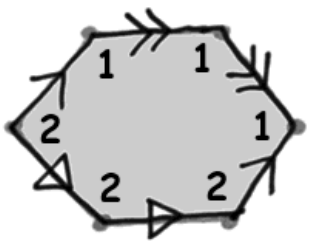
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



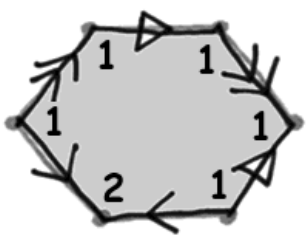
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

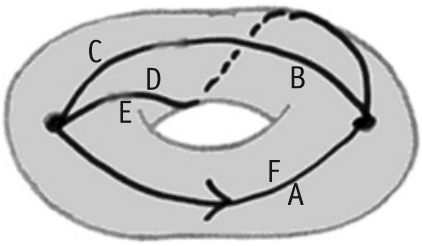
no

Practice First Exam CD

MATH V1011: Surfaces and Knots, Spring, 2003

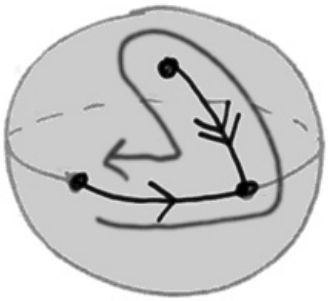
Answer Key

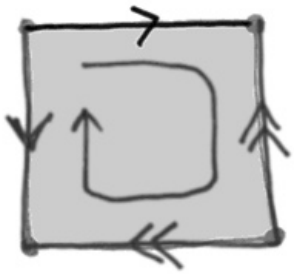
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**B**	**F**	**E**	**C**	**A**

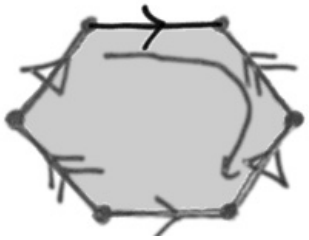
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





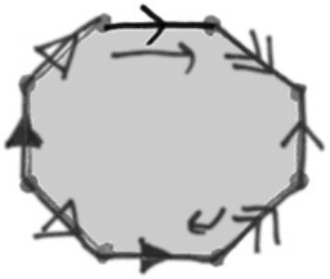
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



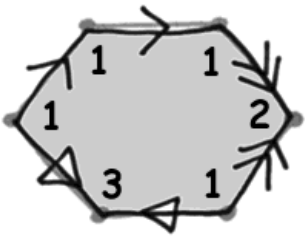
$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



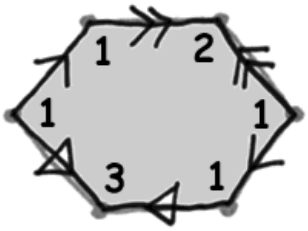
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



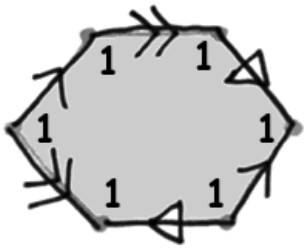
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



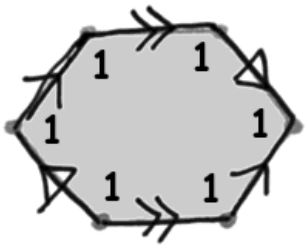
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



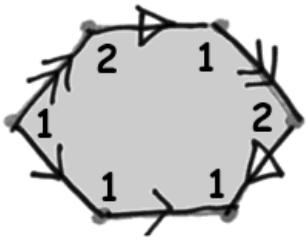
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



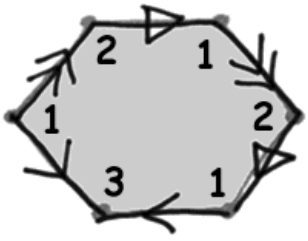
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



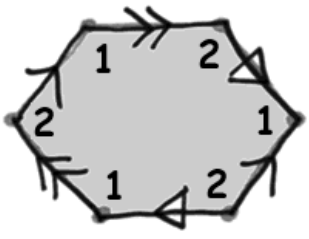
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



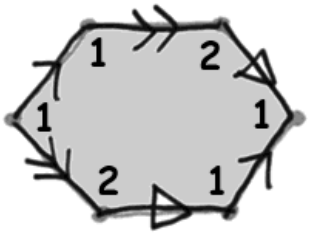
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

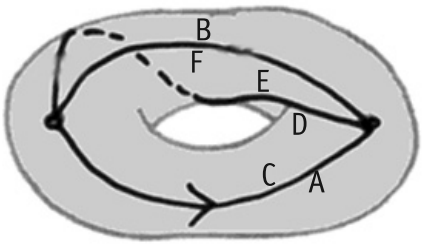
yes

Practice First Exam CE

MATH V1011: Surfaces and Knots, Spring, 2003

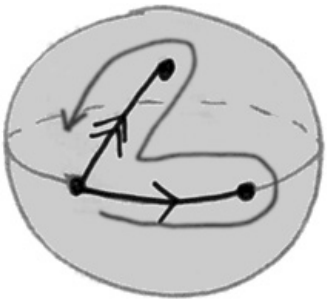
Answer Key

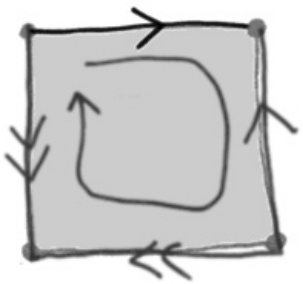
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**D**	**C**	**F**	**E**	**A**

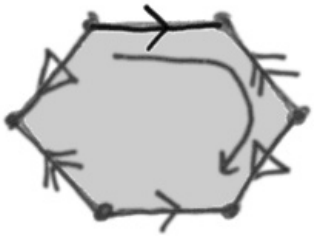
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





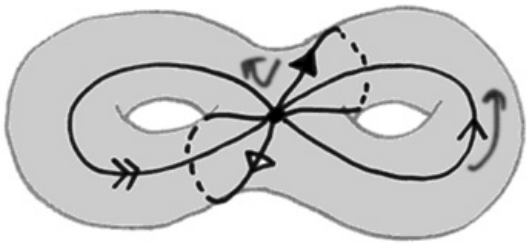
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

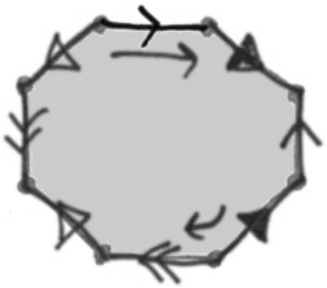
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

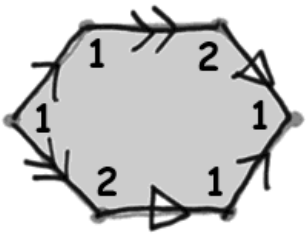
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





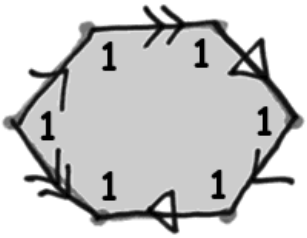
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



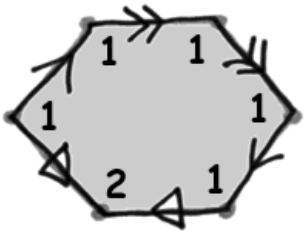
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



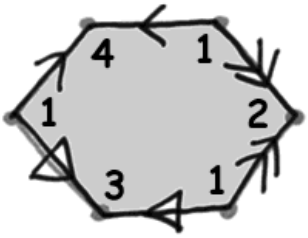
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



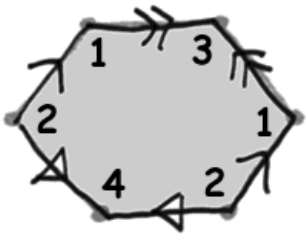
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



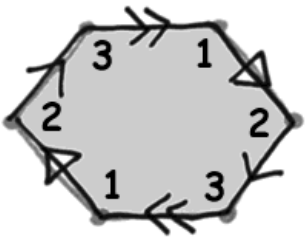
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



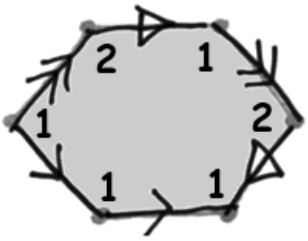
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



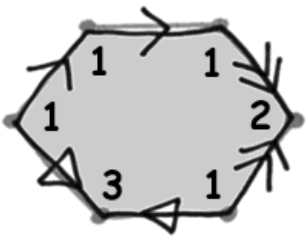
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

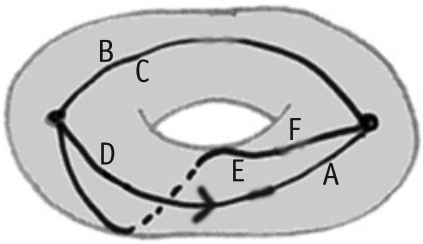
no

Practice First Exam CF

MATH V1011: Surfaces and Knots, Spring, 2003

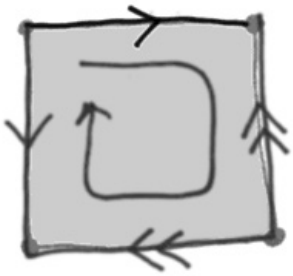
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



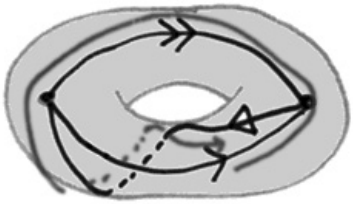
A	**B**	**E**	**D**	**C**	**F**	**A**

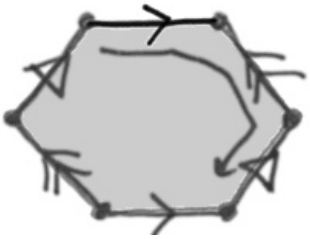
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

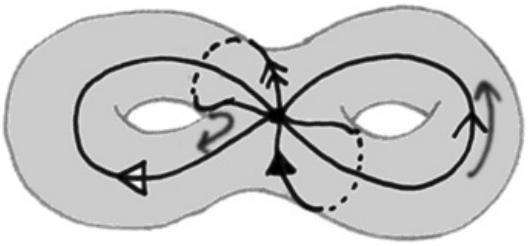
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

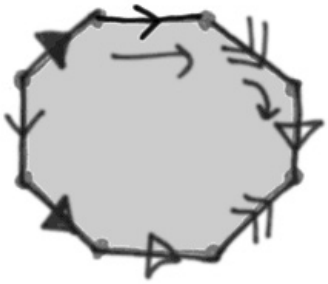




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

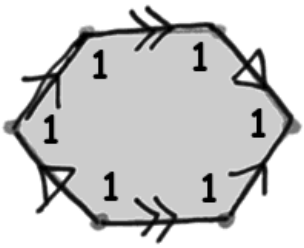
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





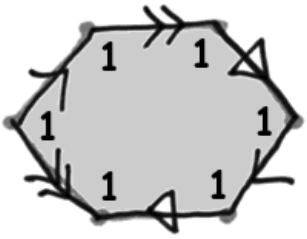
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



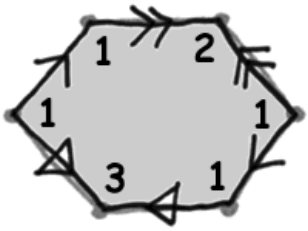
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



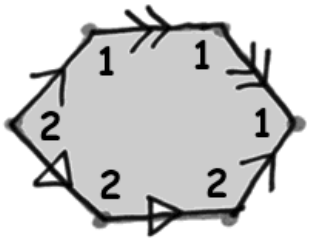
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



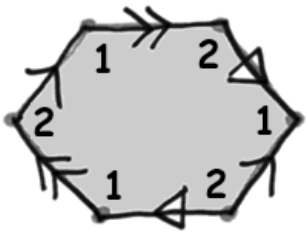
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



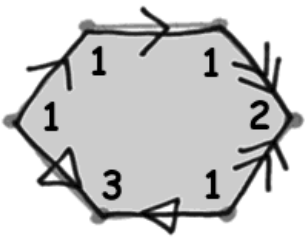
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



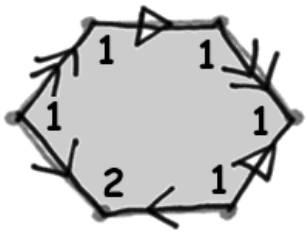
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



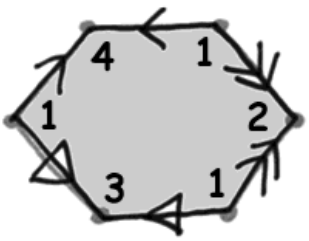
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 4 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 2 \end{array}$$

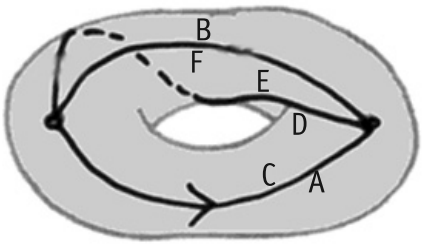
yes

Practice First Exam CG

MATH V1011: Surfaces and Knots, Spring, 2003

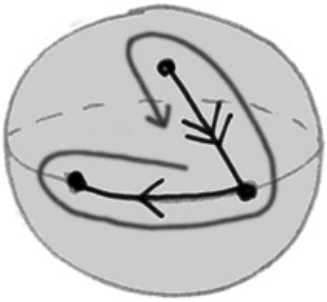
Answer Key

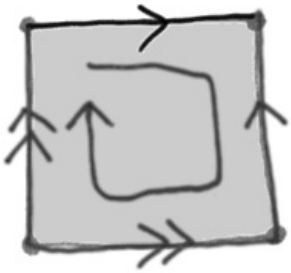
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**D**	**C**	**F**	**E**	**A**

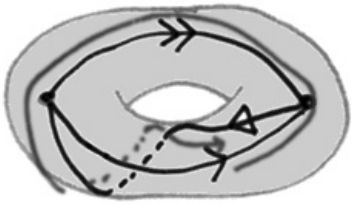
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

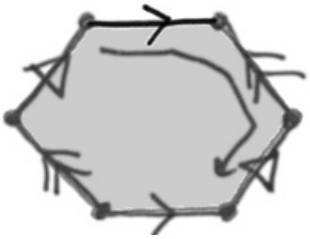




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

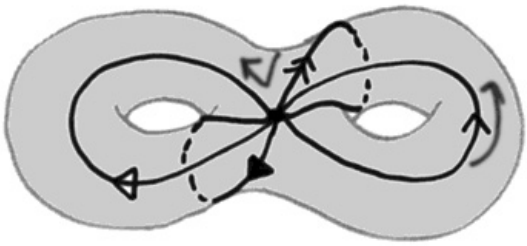
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

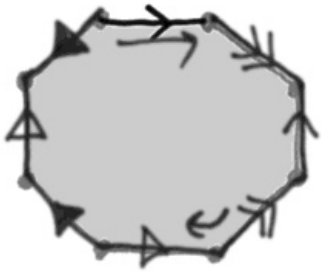




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

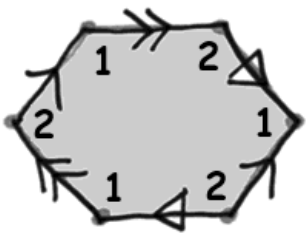
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





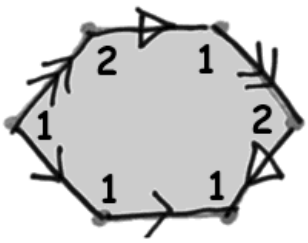
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



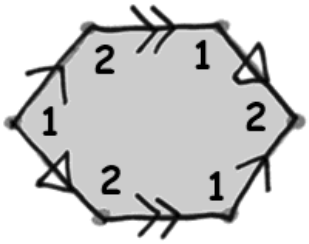
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



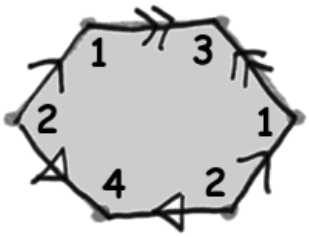
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



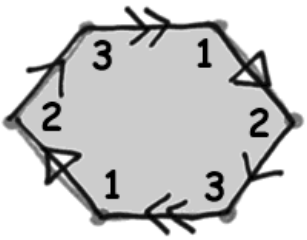
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



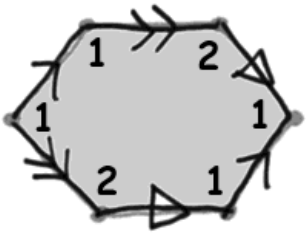
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



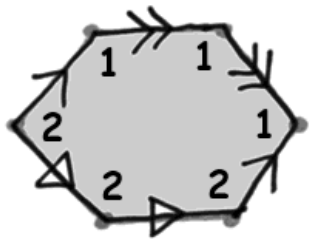
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



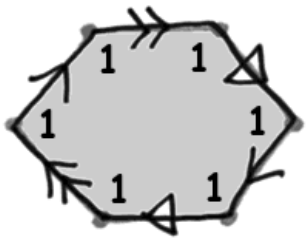
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

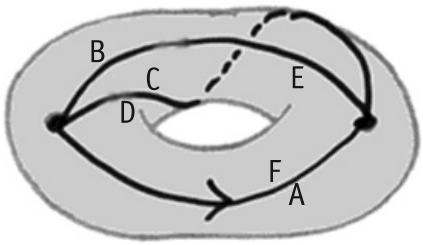
no

Practice First Exam CH

MATH V1011: Surfaces and Knots, Spring, 2003

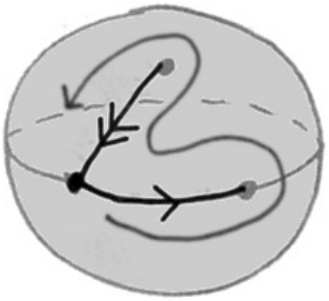
Answer Key

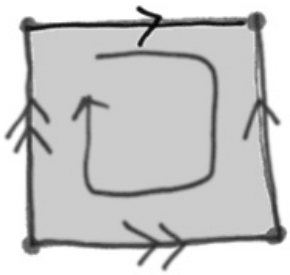
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**C**	**E**	**F**	**D**	**B**	**A**

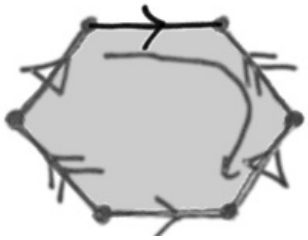
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





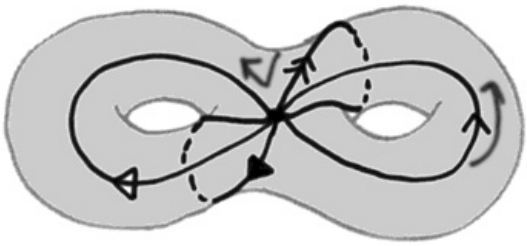
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

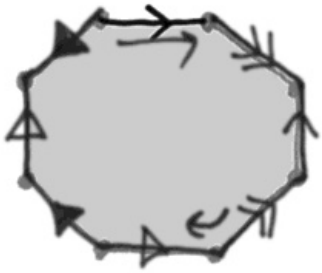
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

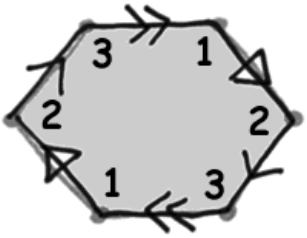
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





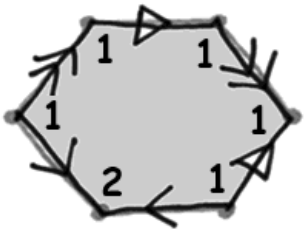
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



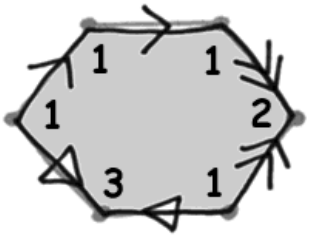
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



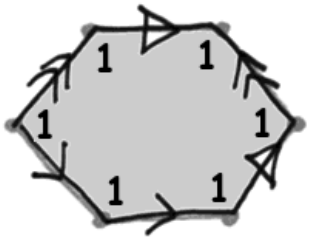
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



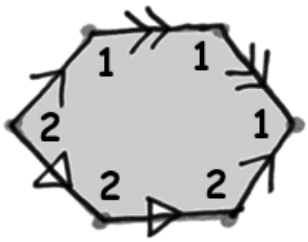
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



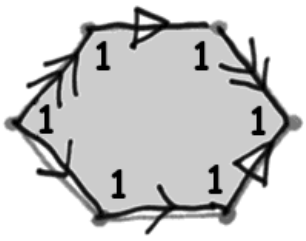
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



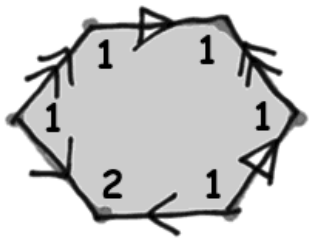
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



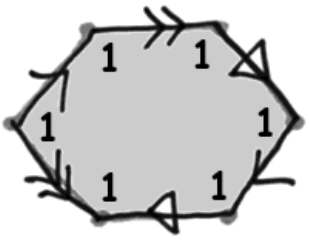
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

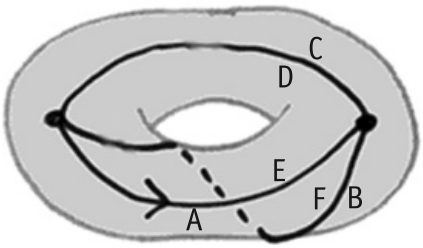
no

Practice First Exam CI

MATH V1011: Surfaces and Knots, Spring, 2003

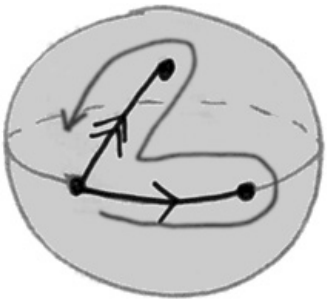
Answer Key

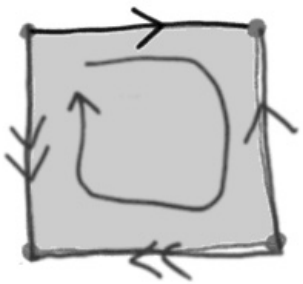
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**F**	**D**	**E**	**B**	**C**	**A**

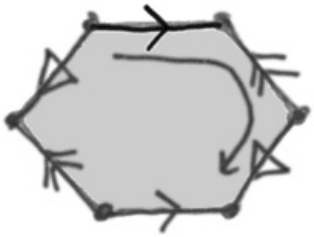
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





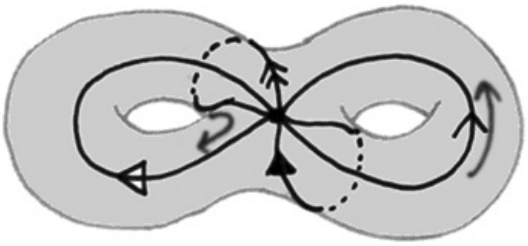
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

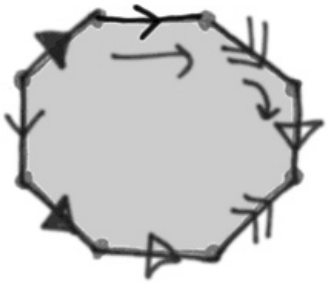
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

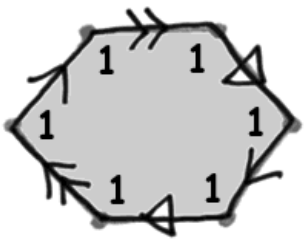
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





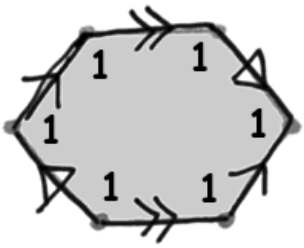
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



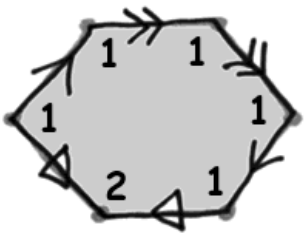
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



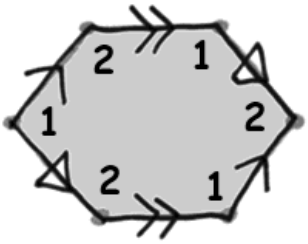
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



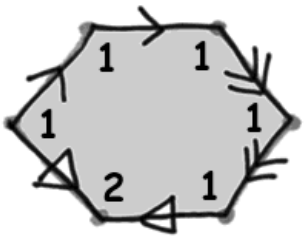
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



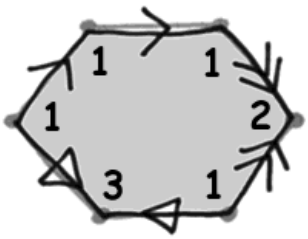
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

yes



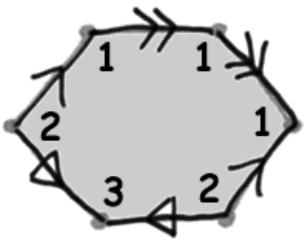
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



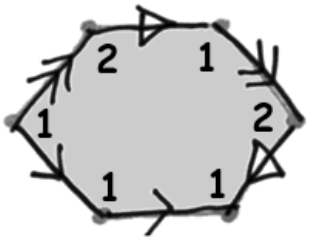
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

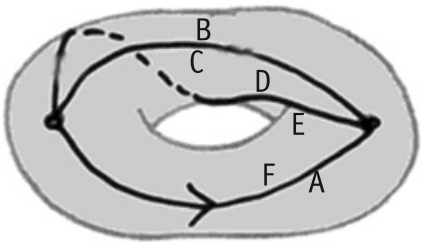
no

Practice First Exam CJ

MATH V1011: Surfaces and Knots, Spring, 2003

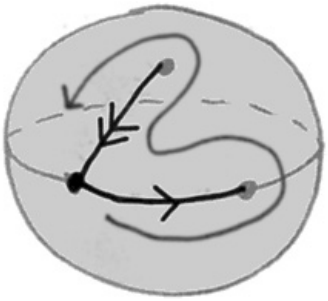
Answer Key

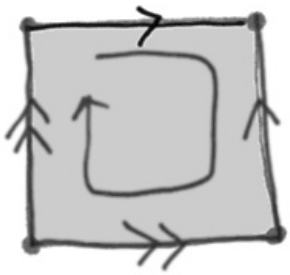
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**F**	**C**	**D**	**A**

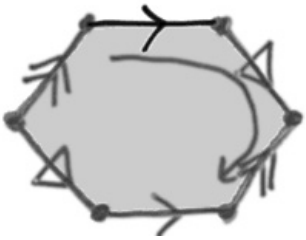
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





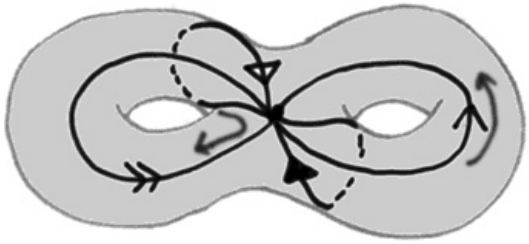
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

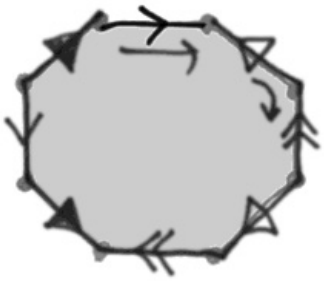
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

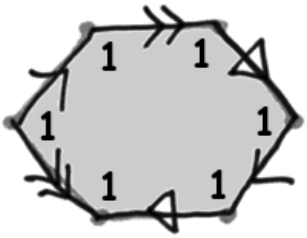
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





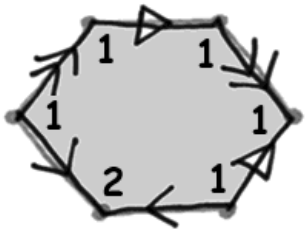
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



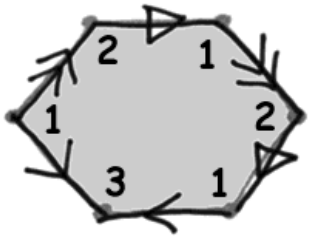
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



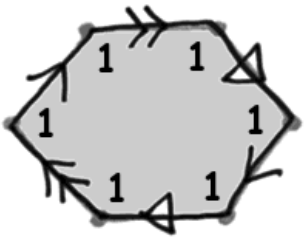
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



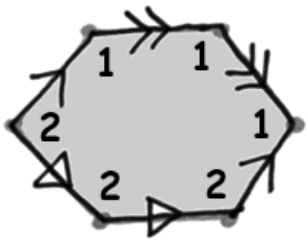
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



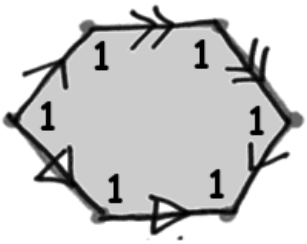
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



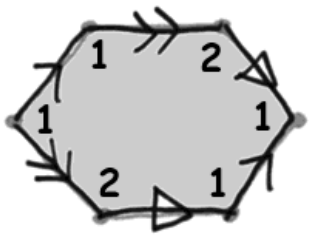
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



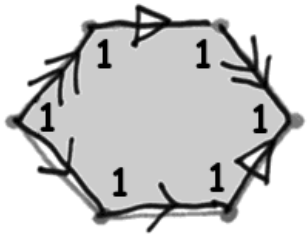
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

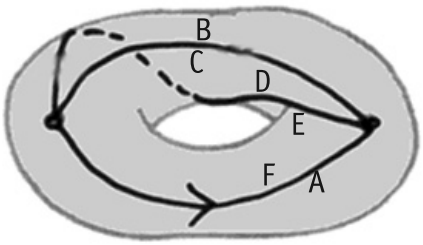
no

Practice First Exam CK

MATH V1011: Surfaces and Knots, Spring, 2003

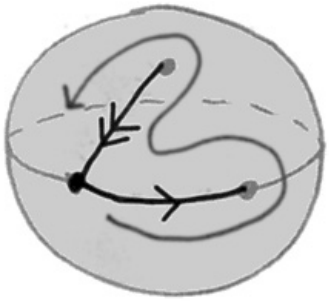
Answer Key

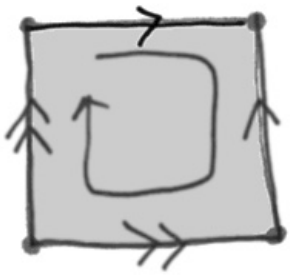
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**F**	**C**	**D**	**A**

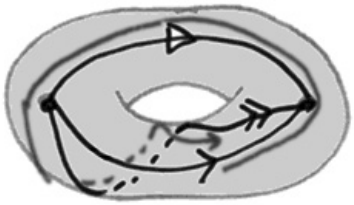
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

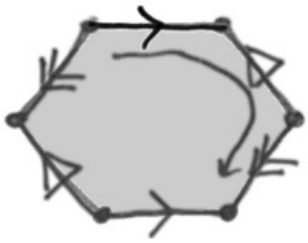




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

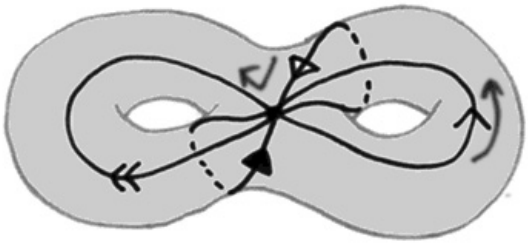
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

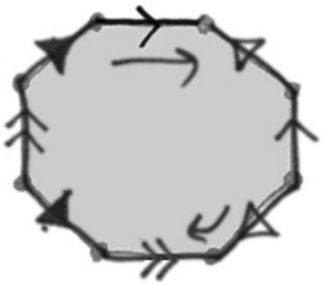




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

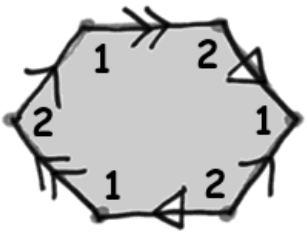
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





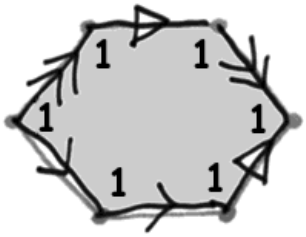
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



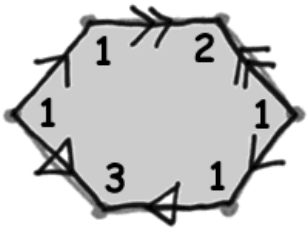
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



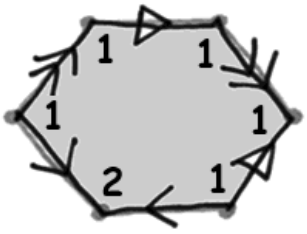
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



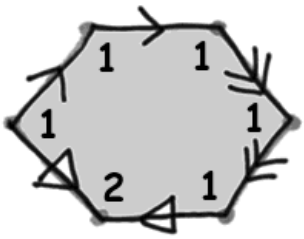
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



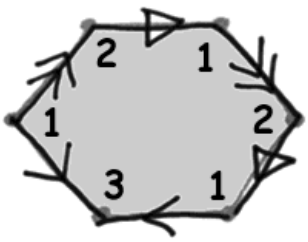
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



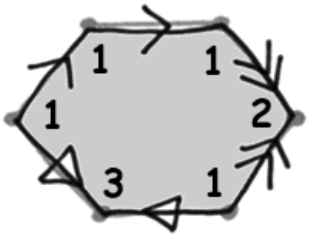
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



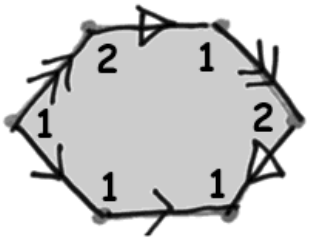
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

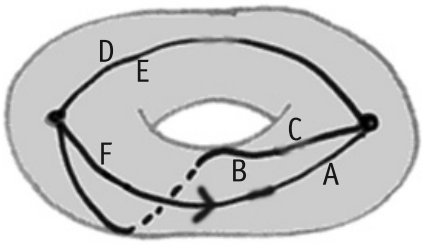
no

Practice First Exam CL

MATH V1011: Surfaces and Knots, Spring, 2003

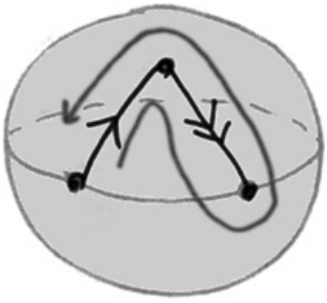
Answer Key

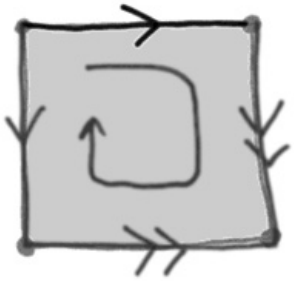
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**B**	**F**	**E**	**C**	**A**

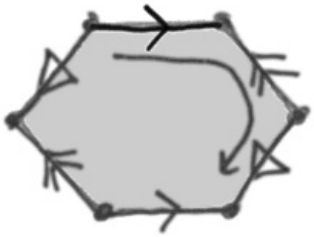
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





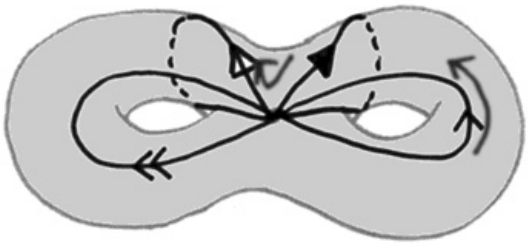
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

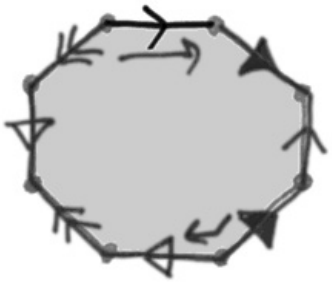
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

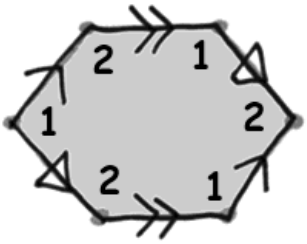
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





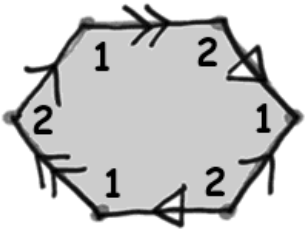
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



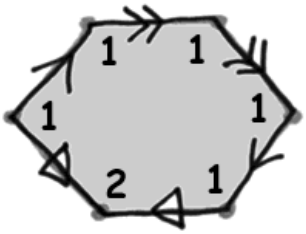
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



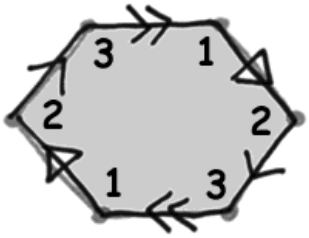
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



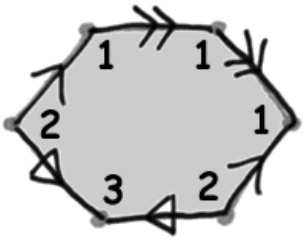
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



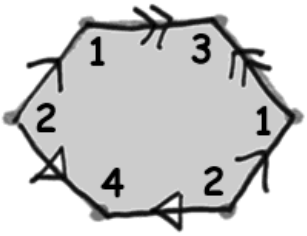
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



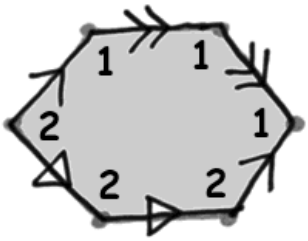
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



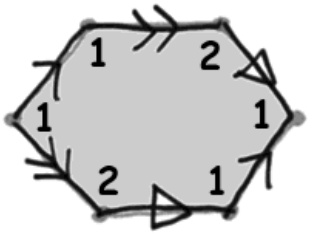
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

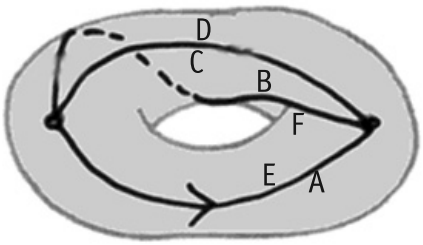
yes

Practice First Exam CM

MATH V1011: Surfaces and Knots, Spring, 2003

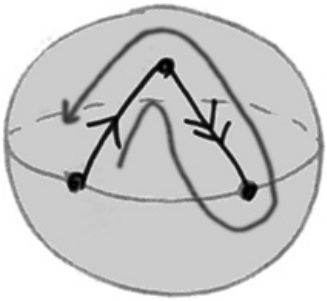
Answer Key

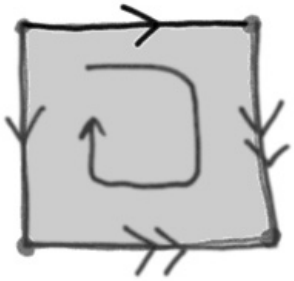
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**E**	**C**	**B**	**A**

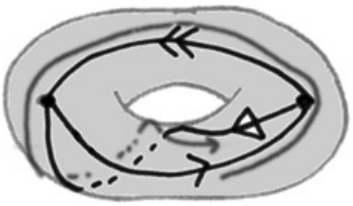
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

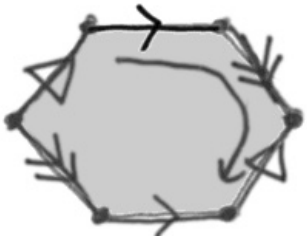




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

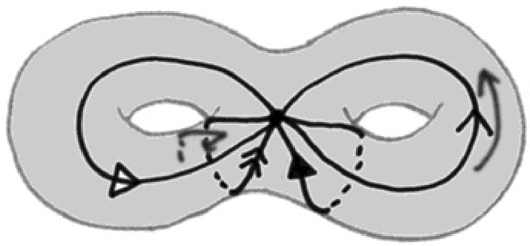
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

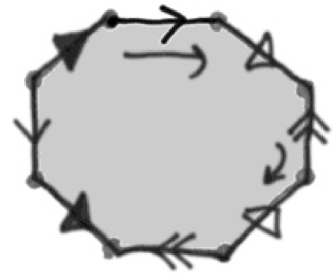




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

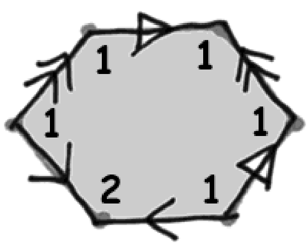
[**4**] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





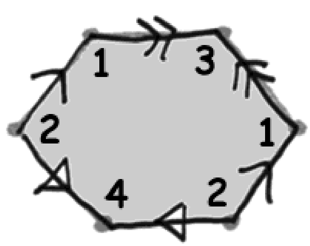
$$\begin{array}{rcr} +\ v &=& 1 \\ -\ e &=& 4 \\ +\ f &=& 1 \\ \hline \chi &=& -2 \end{array}$$

[**5**] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



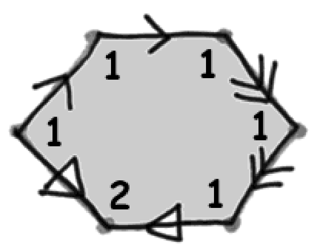
$$\begin{array}{rcr} +\ v &=& 2 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& 0 \end{array}$$

yes



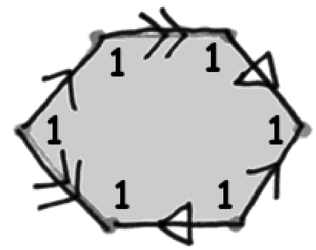
$$\begin{array}{rcr} +\ v &=& 4 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& 2 \end{array}$$

yes



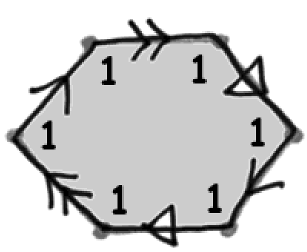
$$\begin{array}{rcr} +\ v &=& 2 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& 0 \end{array}$$

no



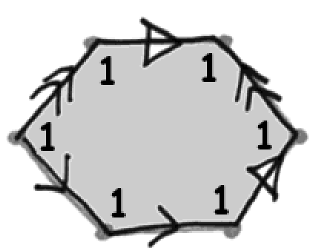
$$\begin{array}{rcr} +\ v &=& 1 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& -1 \end{array}$$

no



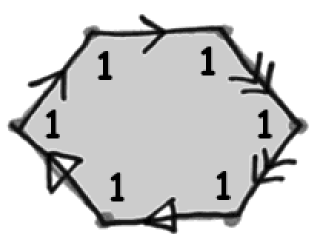
$$\begin{array}{rcr} +\ v &=& 1 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& -1 \end{array}$$

no



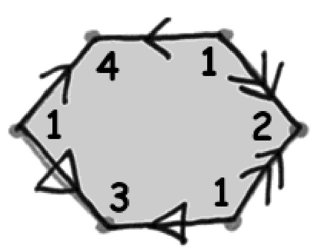
$$\begin{array}{rcr} +\ v &=& 1 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v &=& 1 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v &=& 4 \\ -\ e &=& 3 \\ +\ f &=& 1 \\ \hline \chi &=& 2 \end{array}$$

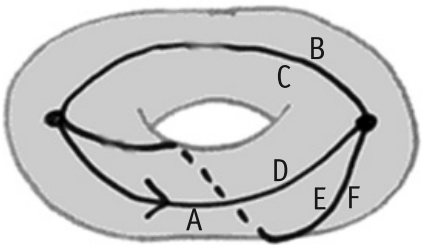
yes

Practice First Exam CN

MATH V1011: Surfaces and Knots, Spring, 2003

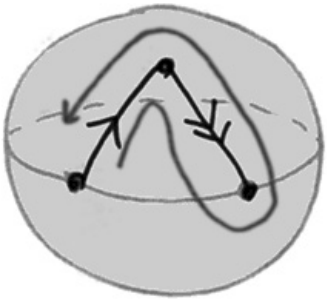
Answer Key

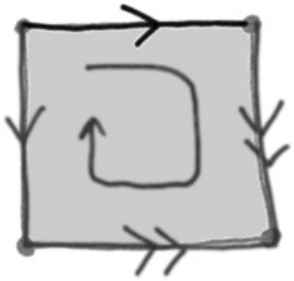
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**E**	**C**	**D**	**F**	**B**	**A**

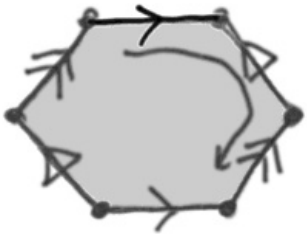
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





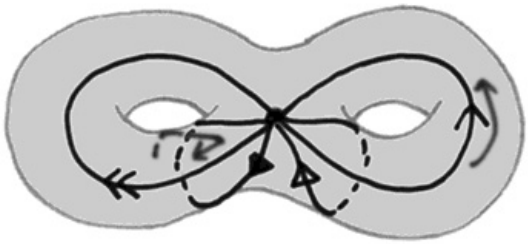
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

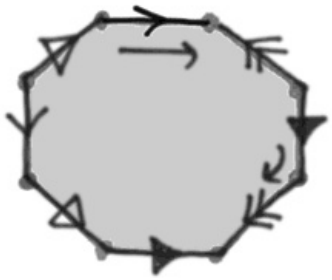
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

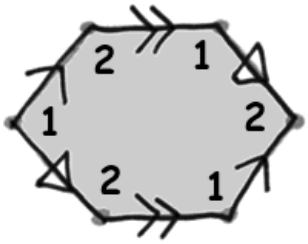
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





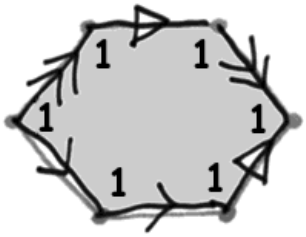
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



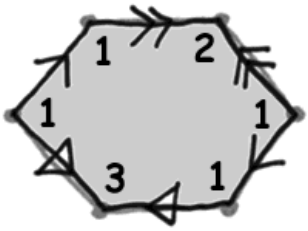
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



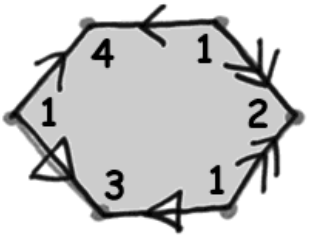
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



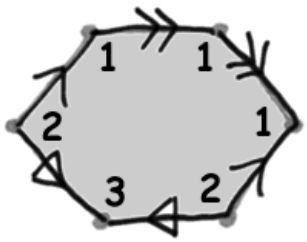
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



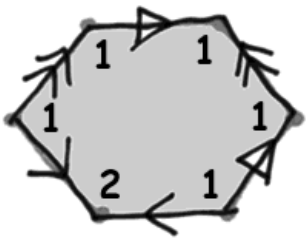
$$\begin{array}{rr} +\ v\ = & 4 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 2 \end{array}$$

yes



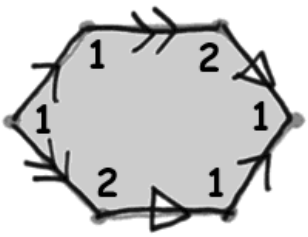
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



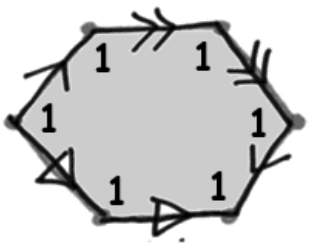
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

yes



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

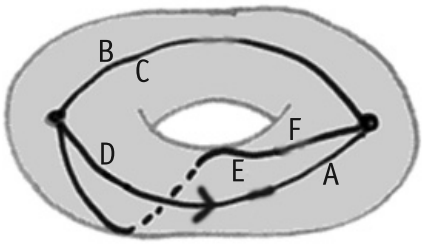
no

Practice First Exam DA

MATH V1011: Surfaces and Knots, Spring, 2003

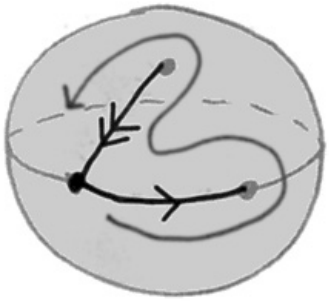
Answer Key

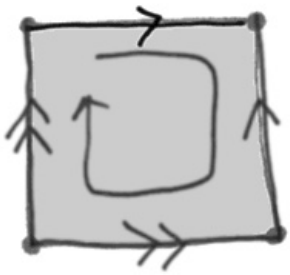
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**D**	**C**	**F**	**A**

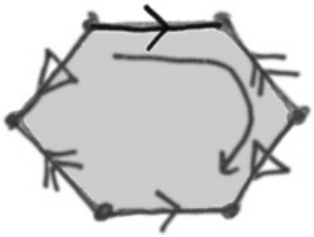
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





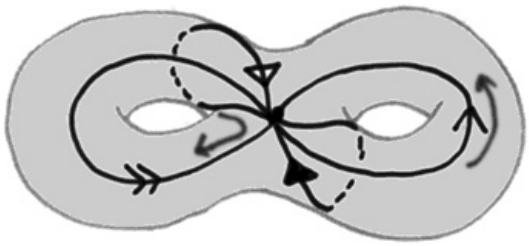
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

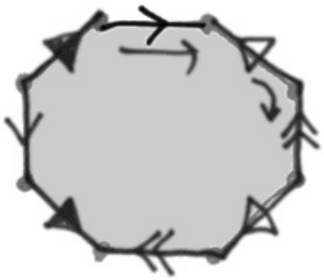
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

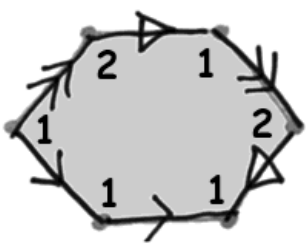
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





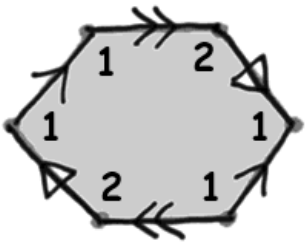
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



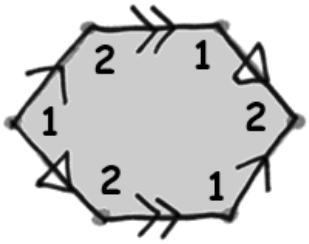
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



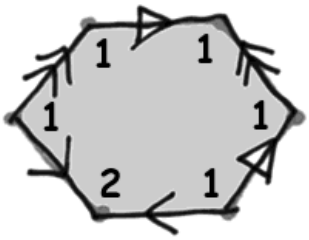
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



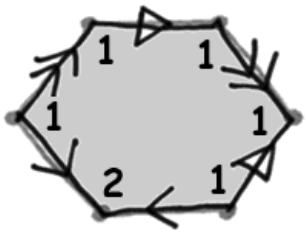
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



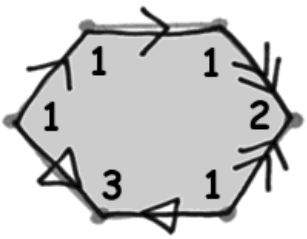
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



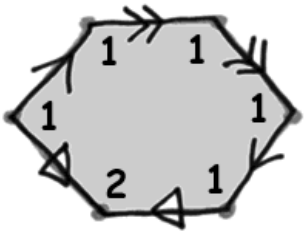
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



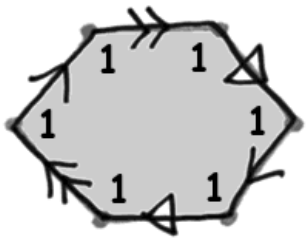
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

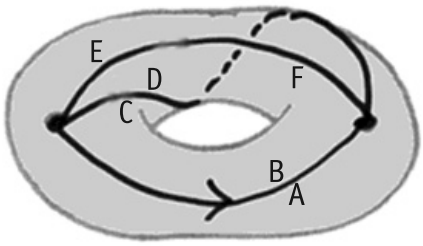
no

Practice First Exam DB

MATH V1011: Surfaces and Knots, Spring, 2003

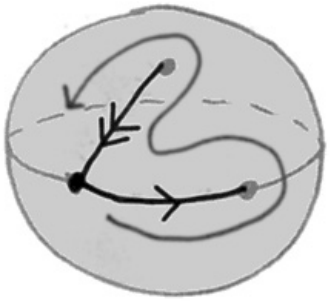
Answer Key

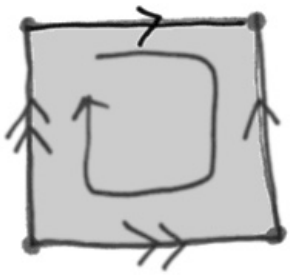
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**D**	**F**	**B**	**C**	**E**	**A**

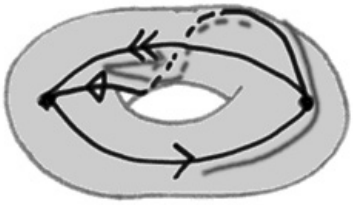
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

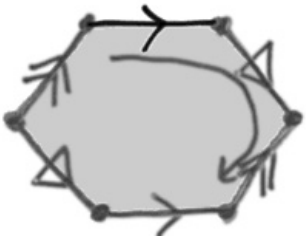




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

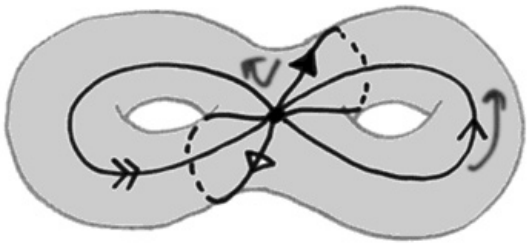
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

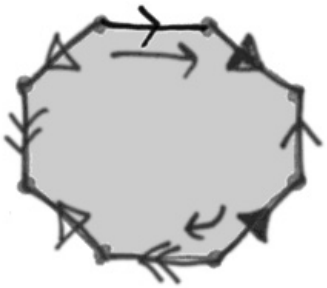




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

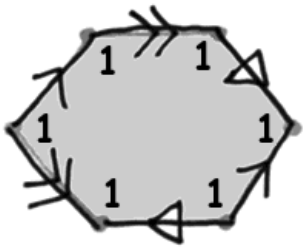
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





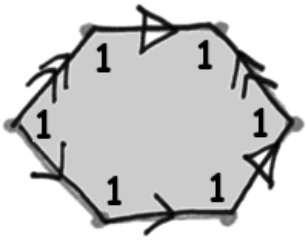
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



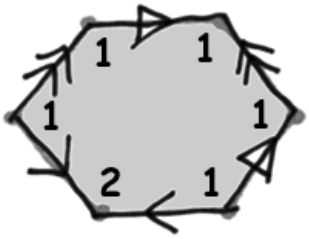
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



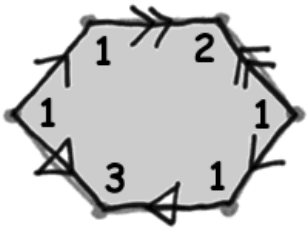
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



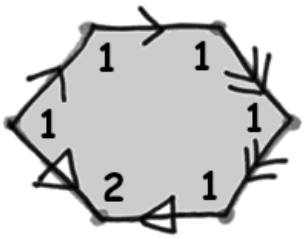
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

yes



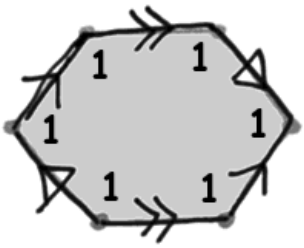
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



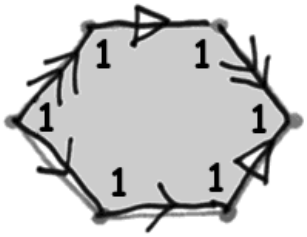
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



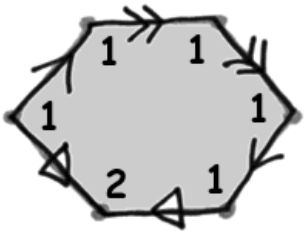
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

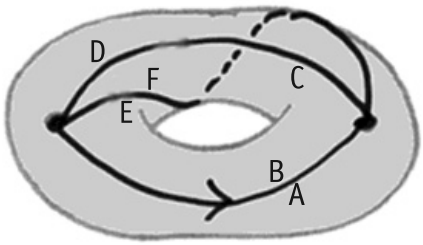
no

Practice First Exam DC

MATH V1011: Surfaces and Knots, Spring, 2003

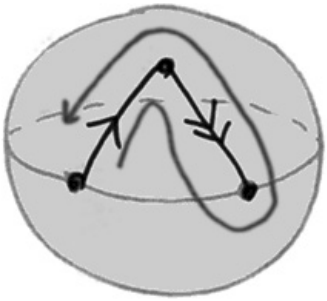
Answer Key

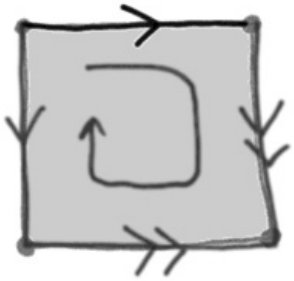
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**F**	**C**	**B**	**E**	**D**	**A**

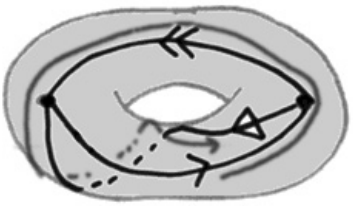
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

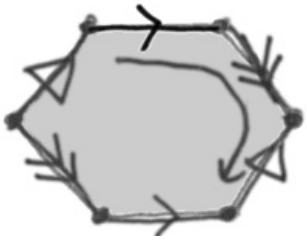




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

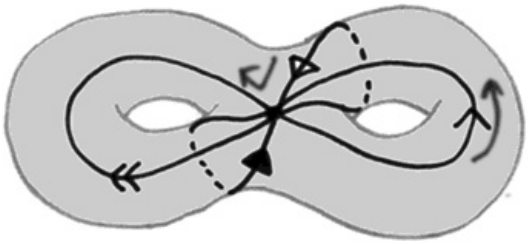
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

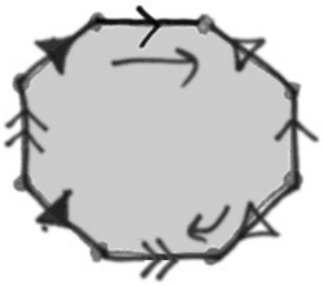




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

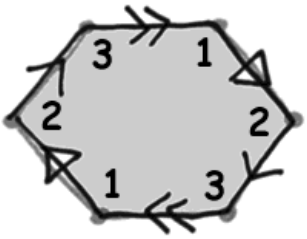
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





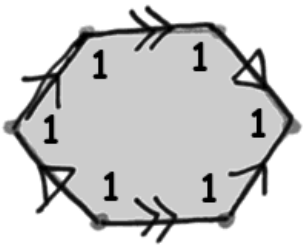
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 4 \\ +\ f = & 1 \\ \hline \chi = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



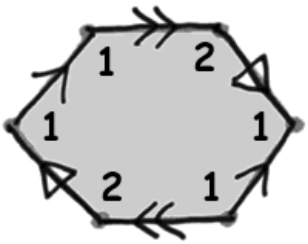
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



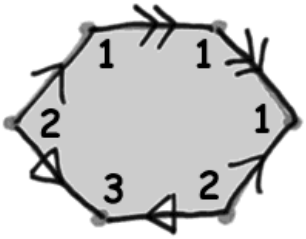
$$\begin{array}{rr} +\ v = & 1 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & -1 \end{array}$$

no



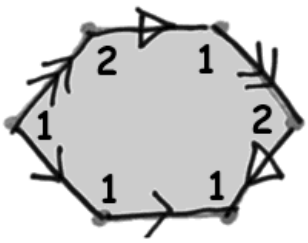
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



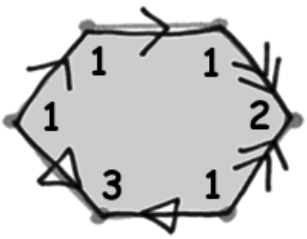
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



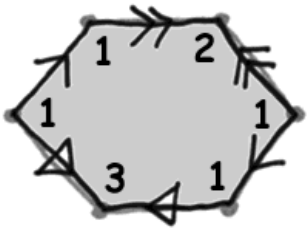
$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

no



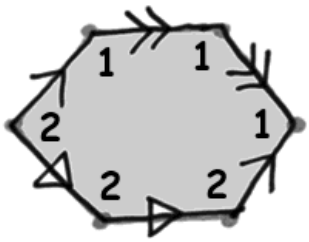
$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 3 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 1 \end{array}$$

no



$$\begin{array}{rr} +\ v = & 2 \\ -\ e = & 3 \\ +\ f = & 1 \\ \hline \chi = & 0 \end{array}$$

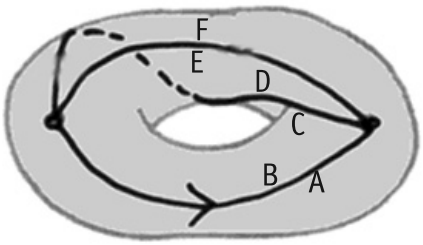
no

Practice First Exam DD

MATH V1011: Surfaces and Knots, Spring, 2003

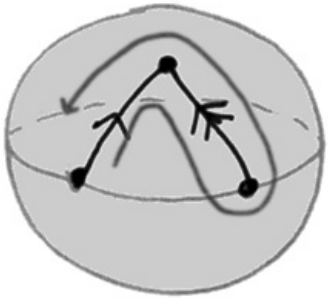
Answer Key

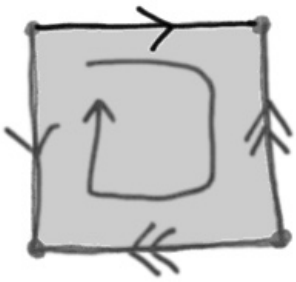
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**F**	**C**	**B**	**E**	**D**	**A**

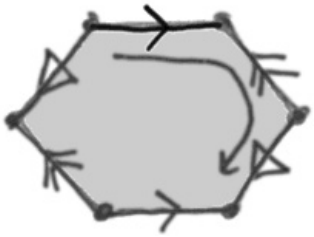
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





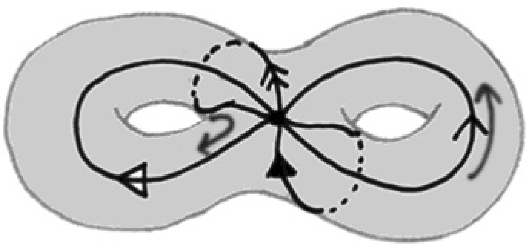
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

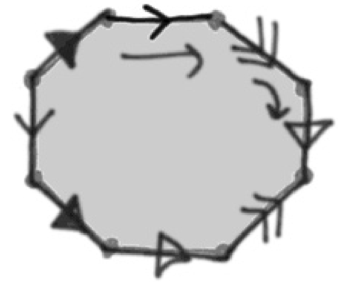
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

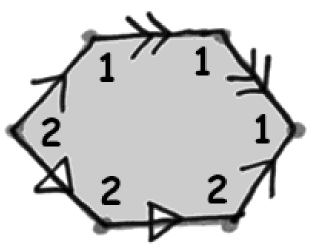
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



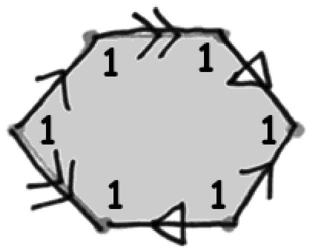


$+\ v = 1$
$-\ e = 4$
$+\ f = 1$
$\chi = -2$

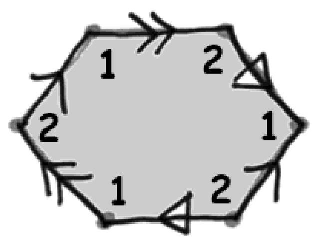
[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



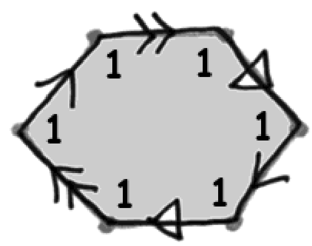
$+\ v = 2$
$-\ e = 3$
$+\ f = 1$
$\chi = 0$
no



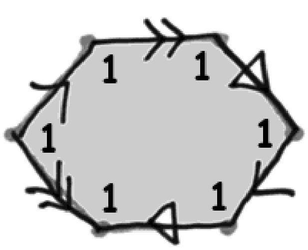
$+\ v = 1$
$-\ e = 3$
$+\ f = 1$
$\chi = -1$
no



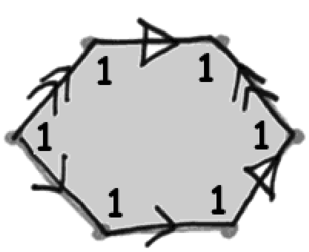
$+\ v = 2$
$-\ e = 3$
$+\ f = 1$
$\chi = 0$
no



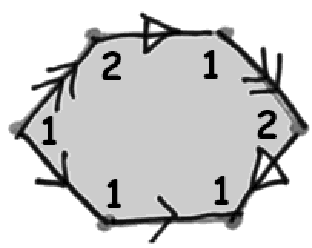
$+\ v = 1$
$-\ e = 3$
$+\ f = 1$
$\chi = -1$
no



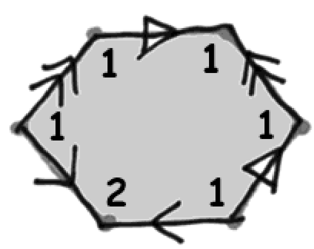
$+\ v = 1$
$-\ e = 3$
$+\ f = 1$
$\chi = -1$
no



$+\ v = 1$
$-\ e = 3$
$+\ f = 1$
$\chi = -1$
no



$+\ v = 2$
$-\ e = 3$
$+\ f = 1$
$\chi = 0$
no



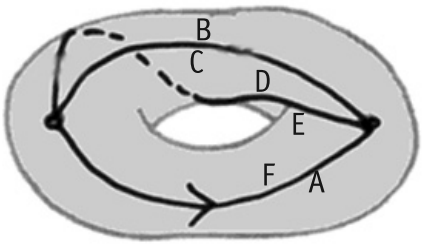
$+\ v = 2$
$-\ e = 3$
$+\ f = 1$
$\chi = 0$
yes

Practice First Exam DE

MATH V1011: Surfaces and Knots, Spring, 2003

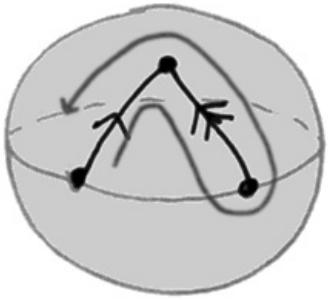
Answer Key

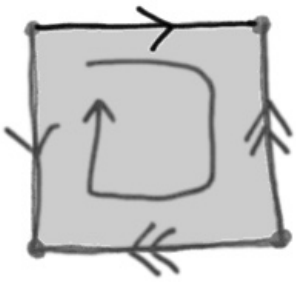
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**B**	**E**	**F**	**C**	**D**	**A**

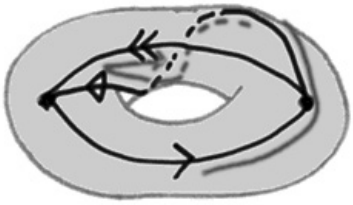
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

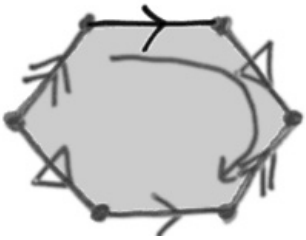




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

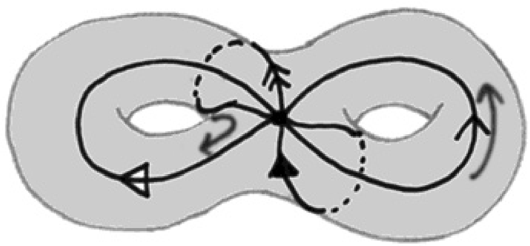
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

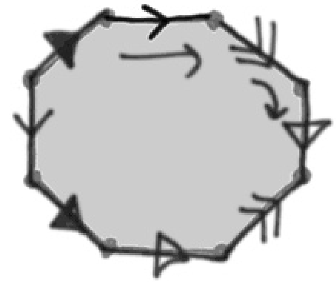




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

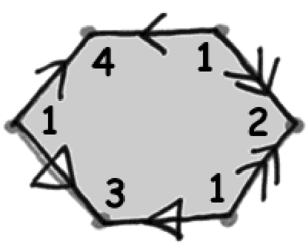
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





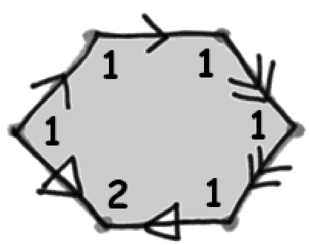
$+\,v = 1$
$-\,e = 4$
$+\,f = 1$
$\chi = -2$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



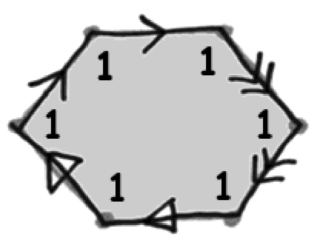
$+\,v = 4$
$-\,e = 3$
$+\,f = 1$
$\chi = 2$

yes



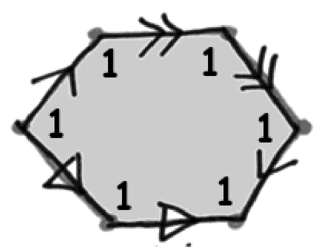
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$

no



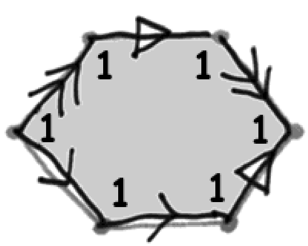
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$

no



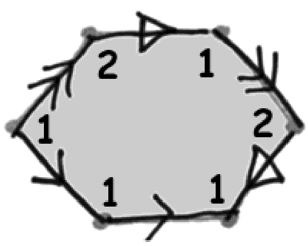
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$

no



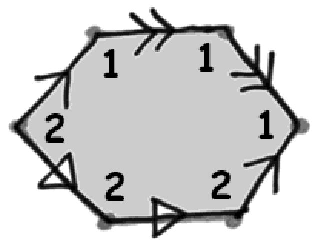
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$

no



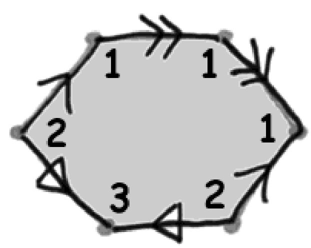
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$

no



$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$

no



$+\,v = 3$
$-\,e = 3$
$+\,f = 1$
$\chi = 1$

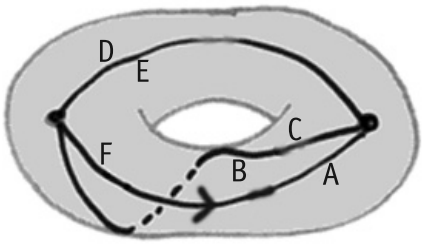
no

Practice First Exam DF

MATH V1011: Surfaces and Knots, Spring, 2003

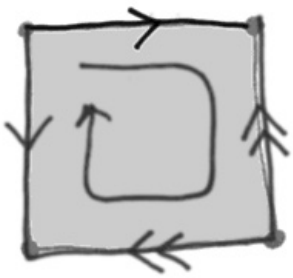
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



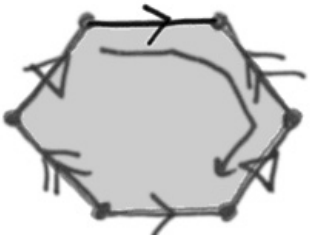
A	**D**	**B**	**F**	**E**	**C**	**A**

[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



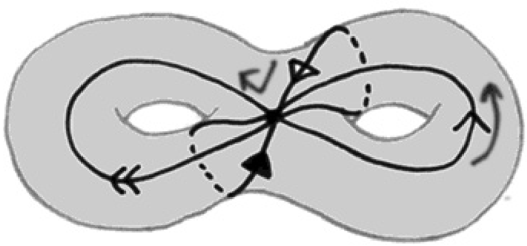
$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

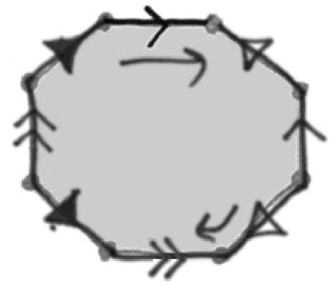
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

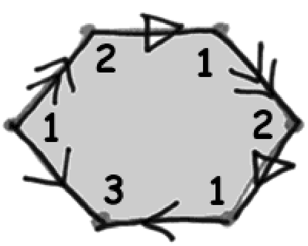
[**4**] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



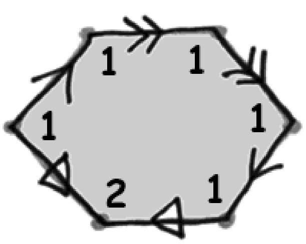


$+\,v = 1$
$-\,e = 4$
$+\,f = 1$
$\chi = -2$

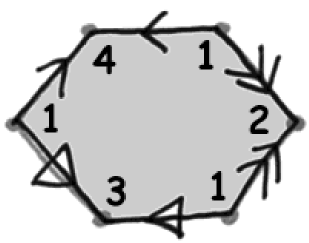
[**5**] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



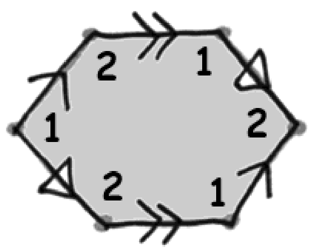
$+\,v = 3$
$-\,e = 3$
$+\,f = 1$
$\chi = 1$
no



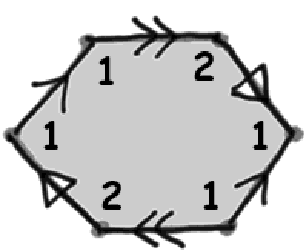
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$
no



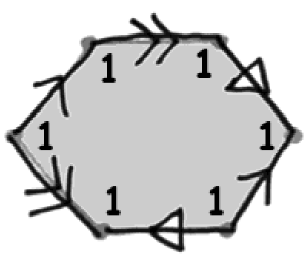
$+\,v = 4$
$-\,e = 3$
$+\,f = 1$
$\chi = 2$
yes



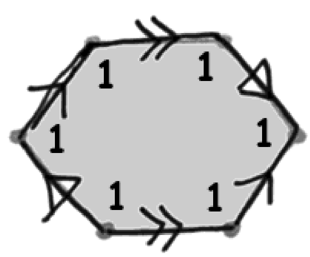
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$
yes



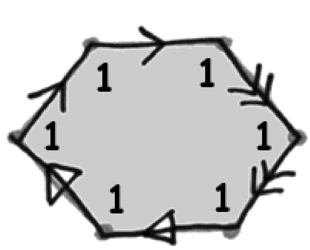
$+\,v = 2$
$-\,e = 3$
$+\,f = 1$
$\chi = 0$
no



$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no



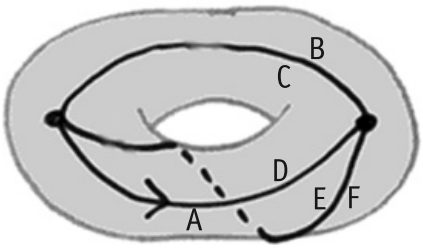
$+\,v = 1$
$-\,e = 3$
$+\,f = 1$
$\chi = -1$
no

Practice First Exam DG

MATH V1011: Surfaces and Knots, Spring, 2003

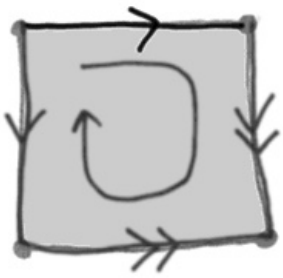
Answer Key

[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



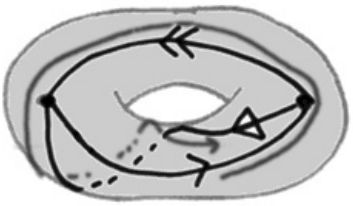
A	**E**	**C**	**D**	**F**	**B**	**A**

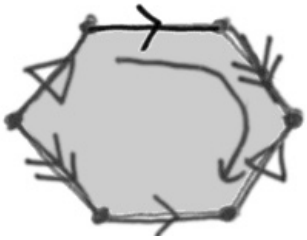
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.



$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

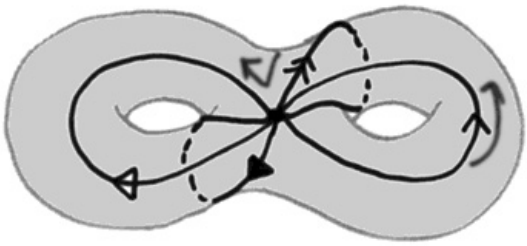
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

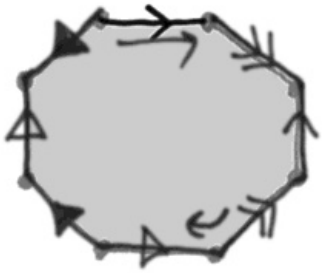




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

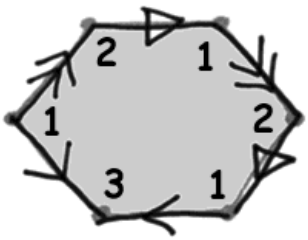
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





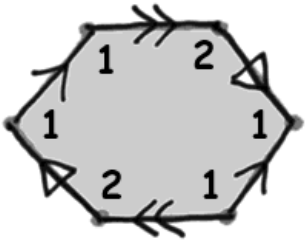
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 4 \\ +\ f & = & 1 \\ \hline \chi & = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



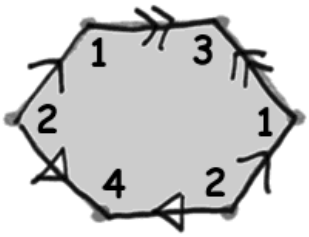
$$\begin{array}{rcr} +\ v & = & 3 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 1 \end{array}$$

no



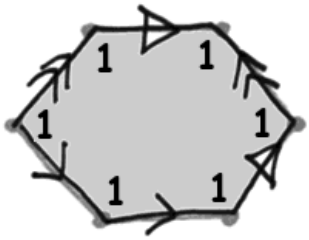
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



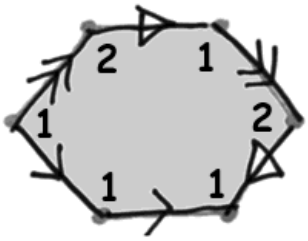
$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

yes



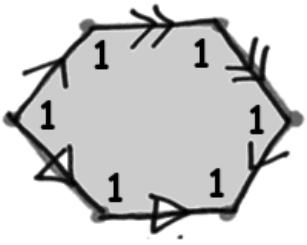
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



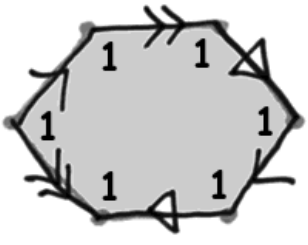
$$\begin{array}{rcr} +\ v & = & 2 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 0 \end{array}$$

no



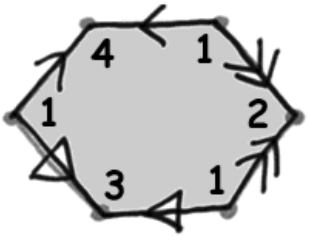
$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 1 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & -1 \end{array}$$

no



$$\begin{array}{rcr} +\ v & = & 4 \\ -\ e & = & 3 \\ +\ f & = & 1 \\ \hline \chi & = & 2 \end{array}$$

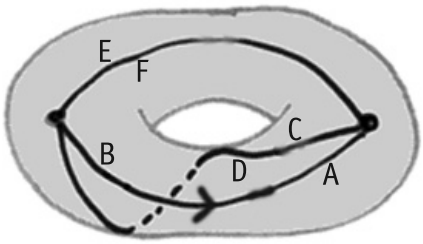
yes

Practice First Exam DH

MATH V1011: Surfaces and Knots, Spring, 2003

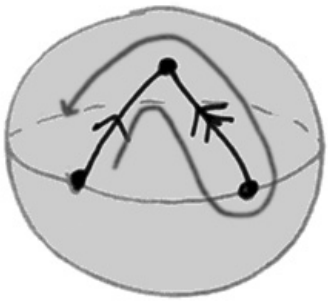
Answer Key

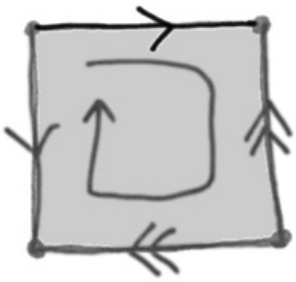
[1] Starting with the letter **A**, walk in the direction of the arrow along the cuts shown, until you return to the letter **A**. In what order do you encounter the letters **B**, **C**, **D**, **E**, and **F**?



A	**E**	**D**	**B**	**F**	**C**	**A**

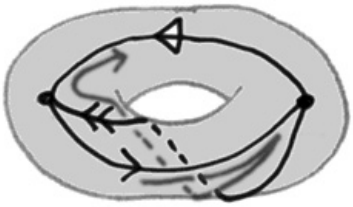
[2] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

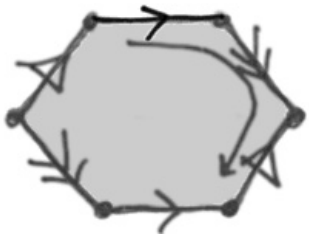




$$\begin{aligned} +\ v &= 3 \\ -\ e &= 2 \\ +\ f &= 1 \\ \hline \chi &= 2 \end{aligned}$$

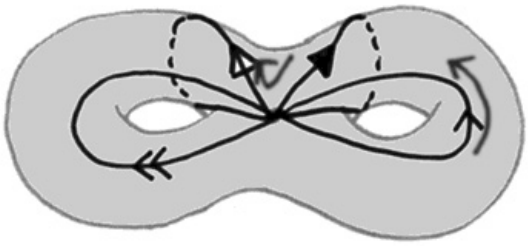
[3] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.

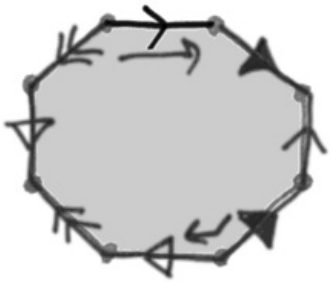




$$\begin{aligned} +\ v &= 2 \\ -\ e &= 3 \\ +\ f &= 1 \\ \hline \chi &= 0 \end{aligned}$$

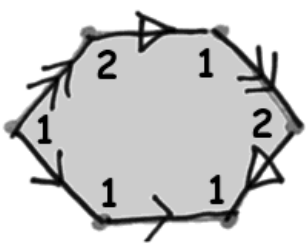
[4] Finish labeling the gluing diagram on the right, so it glues together to form the surface on the left. Compute the Euler characteristic of this surface.





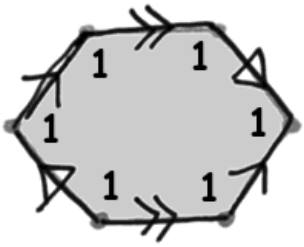
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 4 \\ +\ f\ = & 1 \\ \hline \chi\ = & -2 \end{array}$$

[5] Determine what surface each of the following gluing diagrams represents, by computing its Euler characteristic, and determining whether it is orientable or not.



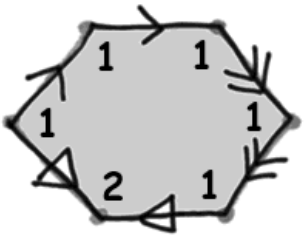
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



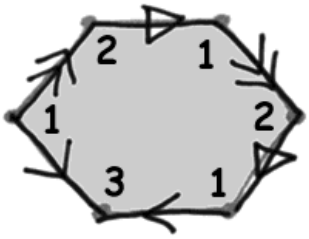
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



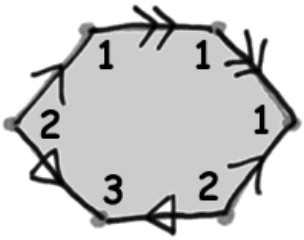
$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no



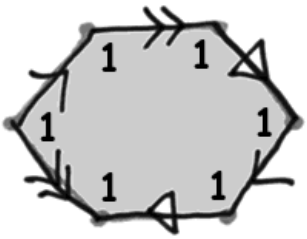
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



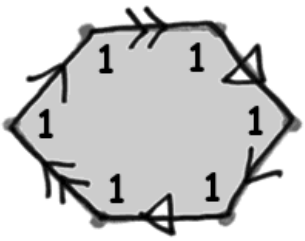
$$\begin{array}{rr} +\ v\ = & 3 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 1 \end{array}$$

no



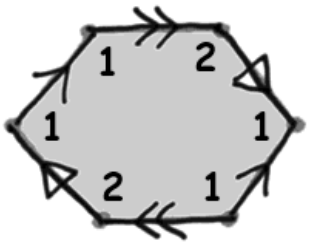
$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 1 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & -1 \end{array}$$

no



$$\begin{array}{rr} +\ v\ = & 2 \\ -\ e\ = & 3 \\ +\ f\ = & 1 \\ \hline \chi\ = & 0 \end{array}$$

no