

Practice Final Answer Key

Surfaces and Knots, Dave Bayer, May 13, 2002

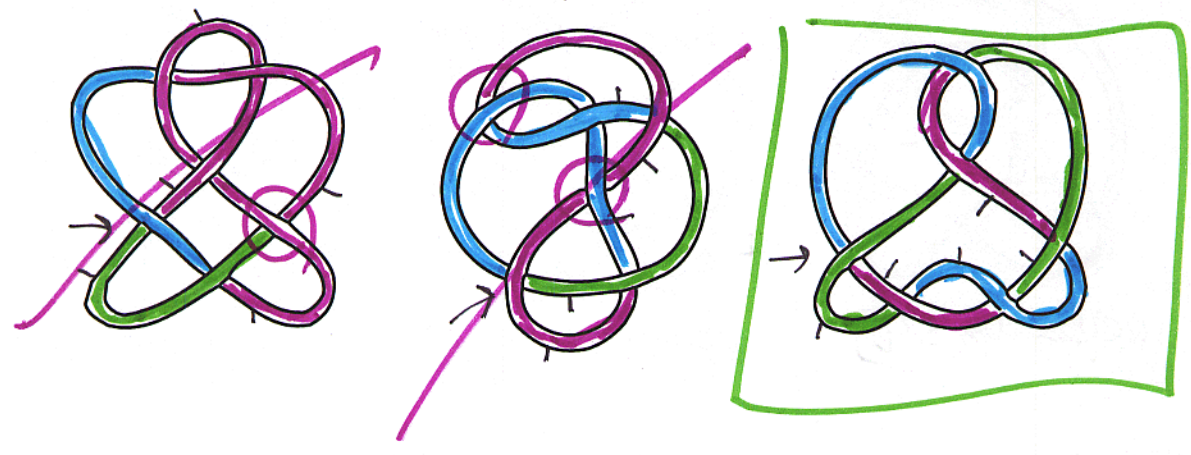
Name: _____ School: _____

[1]	[2]	[3]	[4]	[5]	TOTAL

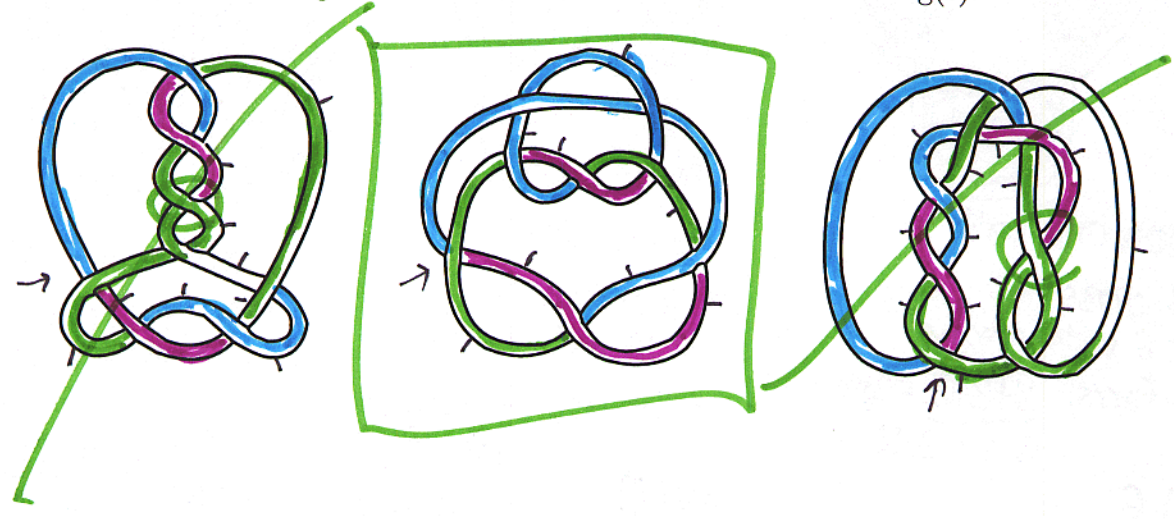
You may use scratch paper, but only this sheet will be graded; please present all answers on this sheet.

In addition to this final, you may optionally retake midterm 2. If you retake midterm 2, your score for midterm 2 will be the average of your scores on both tries, even if your score goes down. Do not retake midterm 2 unless you accept this risk.

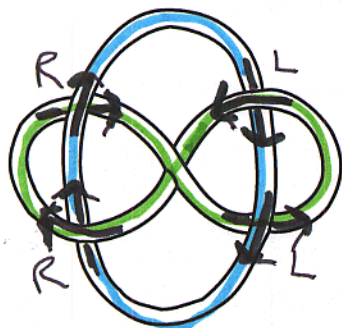
[1] Which of the following knots are 3-colorable? Show the 3-coloring(s).



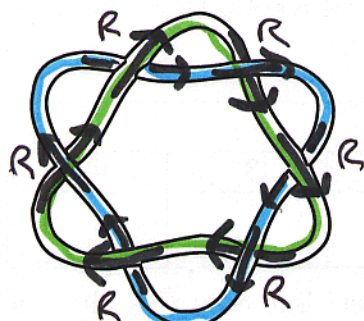
[2] Which of the following knots are 3-colorable? Show the 3-coloring(s).



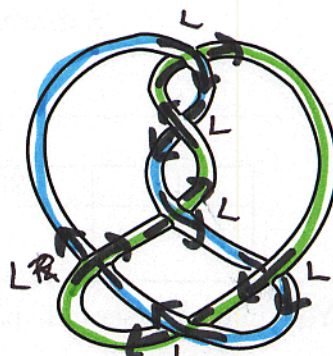
[3] Computing the linking number between the components of each of the following links.



RR|LL $\frac{0}{2} = \boxed{0}$

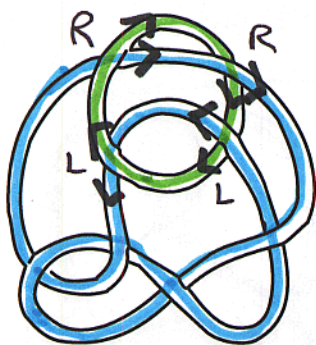


RRRR|RRRR $\frac{6}{2} = \boxed{3}$

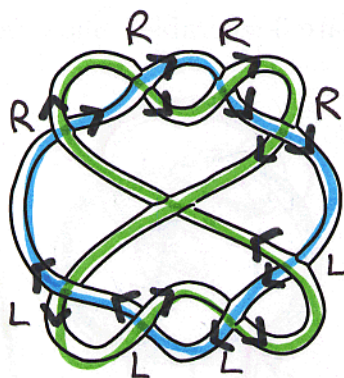


LLLL|LLLL $\frac{6}{2} = \boxed{3}$

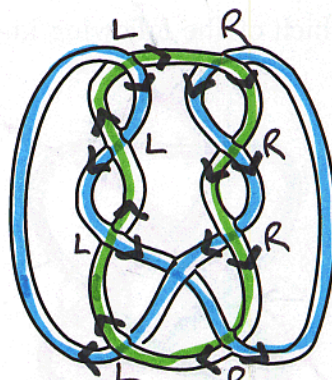
[4] Computing the linking number between the components of each of the following links.



RR|LL $\frac{0}{2} = \boxed{0}$

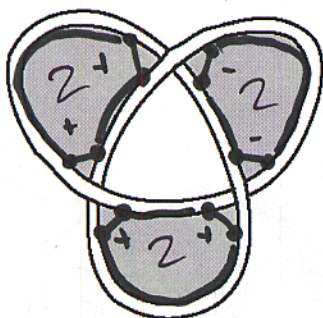


RRRR|LLLL $\frac{0}{2} = \boxed{0}$



LLLL|RRRR $\frac{0}{2} = \boxed{0}$

[5] Classify the spanning surface shown for each of the following knots.

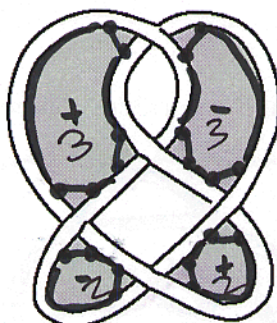


non-orientable

3 crossings
= 6 vertices, 3 edges
+ 3 faces, $2+2+2$ edges
 $\frac{6}{2} = 3$

+V	6
-E	9
+F	3
χ	0

Möbius band



orientable

5 crossings
= 10 vertices, 5 edges
+ 4 faces, $3+3+2+2$ edges
 $\frac{10}{2} = 5$

+V	10
-E	15
+F	4
χ	-1

punctured torus



non-orientable

8 crossings
= 8 vertices, 16 vertices, 8 edges
+ 3 faces, $5+7+4$ edges
 $\frac{16}{2} = 8$

+V	16
-E	24
+F	3
χ	-5