Practive Exam 1

Linear Algebra, Dave Bayer, September 30, 1999

Name: _____

ID: _____ School: _____

[1] (6 pts)	[2] (6 pts)	[3] (6 pts)	[4] (6 pts)	[5] (6 pts)	TOTAL

To be graded, this practice exam must be turned in at the end of class on Thursday, September 30. Such exams will be returned in class on the following Tuesday, October 5. Participation is optional; scores will not be used to determine course grades. If you do participate, you may use your judgement in seeking any assistance of your choosing, or you may take this test under simulated exam conditions. If you don't participate, you are electing to join the control group.

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] Solve the following system of equations:

Γ	2	-1	0	ך 0	$\lceil w \rceil$		$\lceil -1 \rceil$	
	-1	2	-1	0	x		0	
	0	-1	2	-1	y	=	0	
L	0	0	-1	$2 \rfloor$	$\lfloor z \rfloor$		-6	

[2] Compute a matrix giving the number of walks of length 4 between pairs of vertices of the following graph:



[3] Express the following matrix as a product of elementary matrices:

ΓΟ	1	3	0	٦
0	0	1	4	
0	0	0	1	
$\lfloor 2$	0	0	0	

Exam 1

Linear Algebra, Dave Bayer, October 7, 1999

Name: _____

ID: _____ School: _____

) TOTAL	[5] (6 pts)	[4] (6 pts)	[3] (6 pts)	[2] (6 pts)	[1] (6 pts)

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] Solve the following system of equations:

Γ0	1	1]	$\begin{bmatrix} x \end{bmatrix}$		[2]
1	0	1	y	=	0
1	1	0	$\lfloor z \rfloor$		

[2] Compute matrices giving the number of walks of lengths 1, 2, and 3 between pairs of vertices of the following graph:



[3] Express the following matrix as a product of elementary matrices:

Γ	0	1	1	٦
	1	0	1	
L	1	1	0	

Exam 1

Linear Algebra, Dave Bayer, February 15, 2001

Name: _____

ID: _____ School: _____

[1] (6 pts)	[2] (6 pts)	[3] (6 pts)	[4] (6 pts)	[5] (6 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] Solve the following system of equations:

Γ1	1	1]	$\int x$	٦		[4]
1	2	3	y		=	7
1	3	6	$\lfloor z$			11

[2] Express the following matrix as a product of elementary matrices:

Γ1	1	ך 0
0	1	1
$\lfloor 1$	2	2

[4] Let $\mathbf{v}_1 = (1,2)$ and $\mathbf{v}_2 = (1,3)$. Let $L : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear transformation such that

$$L(\mathbf{v}_1) = \mathbf{v}_1, \quad L(\mathbf{v}_2) = \mathbf{v}_1 + \mathbf{v}_2.$$

Find a matrix that represents L with respect to the usual basis $\mathbf{e}_1 = (1,0), \mathbf{e}_2 = (0,1).$

Exam 1

Linear Algebra, Dave Bayer, February 20, 2003

Name: _____

ID: _____ School: _____

ſ	[1] (6 pts)	[2] (6 pts)	[3] (6 pts)	[4] (6 pts)	[5] (6 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] Solve the following system of equations:

Γ	2	-1	0	ך 0	[w]		۲ 0 T
	-1	2	-1	0	x		1
	0	-1	2	-1	y	=	1
L	0	0	-1	$2 \rfloor$	$\lfloor z \rfloor$		

[2] Express the following matrix as a product of elementary matrices:

Γ	1	2	0 -	
	2	1	0	
L	0	0	3	

Exam 1

Linear Algebra, Dave Bayer, February 17, 2004

Name: _____

[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	[6] (5 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] What is the set of all solutions to the following system of equations?

Г	1	-1	1	ך 1	Γ	ך w		ך 1 ק	
	-1	1	1	1		x		1	
	1	-1	1	1		y	=	1	
L	-1	1	1	1]	L	z		1	

[2] Express the following matrix as a product of elementary matrices:

Γ	0	0	2
	1	0	0
L	1	1	1



Exam 1 Linear Algebra, Dave Bayer, February 15, 2005

Name: _

[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	[6] (5 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] What is the set of all solutions to the following system of equations?

Γ0	0	0	ך 0	$\lceil w \rceil$		ך 0 ך	
0	1	1	1	x		2	
0	1	2	2	y	=	3	
LΟ	1	2	$2 \rfloor$	$\lfloor z \rfloor$		3	

[2] Express the following matrix as a product of elementary matrices:

$$\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 3 \\ -2 & 2 & -3 \end{bmatrix}$$



Exam 1 Linear Algebra, Dave Bayer, September 26, 2006

Name: _

[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] What is the set of all solutions to the following system of equations?

$$\begin{bmatrix} 2 & 1 & 4 \\ 1 & 2 & 4 \\ 0 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 3 \end{bmatrix}$$

[2] What is the set of all solutions to the following system of equations?

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ -1 & 0 & -1 & 0 \\ 0 & -1 & 0 & -1 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ -1 \\ -1 \end{bmatrix}$$

[3] Express the following matrix as a product of elementary matrices:

Γ	0	1	1 -
	1	0	2
L	3	1	8 _

[5] Let A be the 3×3 matrix determined by

$$A\begin{bmatrix} 0\\1\\1 \end{bmatrix} = \begin{bmatrix} -1\\0\\2 \end{bmatrix}, \qquad A\begin{bmatrix} 1\\0\\1 \end{bmatrix} = \begin{bmatrix} 0\\-1\\2 \end{bmatrix}, \qquad A\begin{bmatrix} 1\\1\\0 \end{bmatrix} = \begin{bmatrix} 1\\1\\2 \end{bmatrix}$$

Find A.



Name: _

[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	TOTAL

Please work only one problem per page, starting with the pages provided. Clearly label your answer. If a problem continues on a new page, clearly state this fact on both the old and the new pages. Do not use calculators or decimal notation.

[1] What is the set of all solutions to the following system of equations?

[2	1	0]	[x]		[2]
1	0	1	y	=	2
0	1	2	$\lfloor z \rfloor$		0

[2] What is the set of all solutions to each of the following systems of equations?

$$\begin{bmatrix} 1 & 2 & 0 & 1 \\ 1 & 2 & 1 & 0 \\ 2 & 4 & 1 & 1 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \qquad \begin{bmatrix} 1 & 2 & 0 & 1 \\ 1 & 2 & 1 & 0 \\ 2 & 4 & 1 & 1 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

[3] Use Gaussian elimination to find the inverse of the matrix

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 3 \end{bmatrix}$$

[4] Express A as a product of elementary matrices, where

$$\mathsf{A} = \begin{bmatrix} 2 & 3 \\ 1 & 3 \end{bmatrix}$$

[5] Express A^{-1} as a product of elementary matrices, where

$$\mathbf{A} = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$$

[3] Find a 3 \times 3 matrix A such that

$$A\begin{bmatrix}1\\1\\0\end{bmatrix} = \begin{bmatrix}1\\1\\0\end{bmatrix}, \quad A\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}2\\2\\2\end{bmatrix}, \quad A\begin{bmatrix}0\\1\\1\end{bmatrix} = \begin{bmatrix}0\\3\\3\end{bmatrix}$$



Name: _

[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	TOTAL

Please work only one problem per page, starting with the pages provided. Clearly label your answer. If a problem continues on a new page, clearly state this fact on both the old and the new pages. Do not use calculators or decimal notation.

[1] Use Gaussian elimination to find the inverse of the matrix

$$\mathsf{A} = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

[2] What is the set of all solutions to the following system of equations?

$$\begin{bmatrix} 0 & 1 & 1 & 0 & 2 & 0 & 4 \\ 0 & 0 & 0 & 1 & 3 & 0 & 5 \\ 0 & 1 & 1 & 0 & 2 & 1 & 10 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \\ d \\ e \\ f \\ g \end{bmatrix} = \begin{bmatrix} 7 \\ 8 \\ 16 \end{bmatrix}$$

[3] Express A as a product of elementary matrices, where

$$\mathbf{A} = \begin{bmatrix} 0 & 2 & 0 \\ 0 & 0 & 3 \\ 1 & 2 & 3 \end{bmatrix}$$

[5] Compute a matrix giving the number of walks of length 4 between pairs of vertices of the following directed graph:



How many of these paths are labeled ABAB?

Exam 1

Linear Algebra, Dave Bayer, February 15, 2011

Name: _____

[1] (5	pts)	[2]	(5 pt)	s) [3	B] (5	pts)	[4]	(5	pts)	[5] ((5 p	ots)	[6]	(5 pt	ts)	TOTA	L

Please work only one problem per page, starting with the pages provided. Clearly label your answer. If a problem continues on a new page, clearly state this fact on both the old and the new pages.

[1] What is the set of all solutions to the following system of equations?

[3	1	1]	[x]		[8]
2	1	1	y	=	7
$\lfloor 2$	0	1	$\lfloor z \rfloor$		5

[2] What is the set of all solutions to the following system of equations?

$$\begin{bmatrix} 0 & 1 & 1 & 5 & 0 & 9 \\ 0 & 0 & 1 & 3 & 0 & 5 \\ 0 & 0 & 0 & 0 & 1 & 6 \end{bmatrix} \begin{bmatrix} u \\ v \\ w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 3 \\ 4 \end{bmatrix}$$

[3] Use Gaussian elimination to find the inverse of the matrix

$$\mathbf{A} = \begin{bmatrix} 0 & 2 & 1 \\ 0 & 1 & 0 \\ 1 & 3 & 0 \end{bmatrix}$$

[4] Express A as a product of elementary matrices, where

$$\mathbf{A} = \begin{bmatrix} 0 & 3 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$