Exam 1

Linear Algebra, Dave Bayer, February 14, 2012, 9:10am – 10:25am

Name: ______________________________

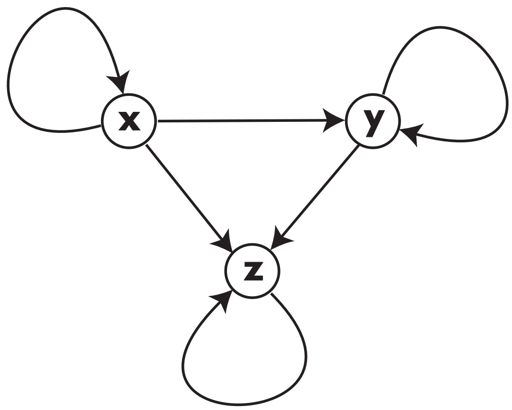
[1] (5 pts)	[2] (5 pts)	[3] (5 pts)	[4] (5 pts)	[5] (5 pts)	[6] (5 pts)	TOTAL

Please draw a box around your final answer. Please use each printed sheet (front and back) *only* for that problem, not for any other problem. There are blank sheets at the end of the exam, to give you more room to work. However, your final answer will not be graded unless it appears on the same sheet (front or back) as the printed problem.

[1] Solve the following system of equations.

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

[**2**] Using matrix multiplication, count the number of paths of length three from x to z.



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

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

[4] Let $L : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear transformation such that $L(v) = v$ for all v on the line $x + 2y = 0$, and $L(v) = 2v$ for all v on the line $x = y$. Find a matrix A that represents L in standard coordinates.

[**5**] Find a basis for the subspace V of $\mathbb{R}^4$ given by the equation $w + x + y + 2z = 0$. Extend this basis to a basis for all of $\mathbb{R}^4$.

[6] Find a system of equations having as solution set the following affine subspace of $\mathbb{R}^4$.

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 0 \\ 1 \\ 1 \\ 1 \end{bmatrix} + t \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \end{bmatrix}$$