Name: _____

Math 314 Linear Algebra (Bueler) Due 6 April 2007

Midterm # 2: CORRECTED Matlab Part

Total of 20 points.

Due *Friday 6 April* at start of class.

For all of these problems, please try to produce a readable result. In particular, please print out only the correct input and result, and not trial and error (when such occurred). You might want to do the work at the Matlab prompt ">>" and then cut and paste only the good parts into the Matlab editor, and print that out. Also, please attach this paper to the front of your output, and remember to write your name at the top.

1. (*5 pts*) Solve the system $A\mathbf{x} = \mathbf{b}$:

$$\begin{bmatrix} -4 & -1 & 3 & 8 & 6 \\ 6 & 5 & 1 & 7 & 1 \\ 6 & -4 & 9 & 6 & 0 \\ 13 & 2 & -9 & 3 & 1 \\ 6 & 2 & 5 & 7 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \\ 3 \\ 2 \\ 4 \end{bmatrix}$$

without using `rref` or `inv`. [*That is, solve the system in the quickest and easiest way using* Matlab.] Then compute the residual $\mathbf{r} = A\mathbf{x} - \mathbf{b}$. Did Matlab do a good job of solving the system?

2. (*5 pts*) Generate three different nonzero matrices of three different sizes A, B, C, but of compatible sizes so that $A(BC)$ is defined, and then check the associative law on these matrices: $A(BC) = (AB)C$. [*It would be nice to have integer entries for these matrices so that it doesn't take up too much space on the printout, and so that I can easily grade the result.*]

3. (*5 pts*) Use Matlab to determine whether this set of vectors is a basis of R_5:

$$\left\{ \begin{array}{l} \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \end{bmatrix}, \quad \begin{bmatrix} 0 & 1 & 2 & 3 & 4 \end{bmatrix}, \quad \begin{bmatrix} -1 & 0 & 0 & 0 & 0 \end{bmatrix}, \\ \begin{bmatrix} 0 & 0 & 0 & 0 & -1 \end{bmatrix}, \quad \begin{bmatrix} 0 & 1 & 1 & 1 & 0 \end{bmatrix} \end{array} \right\}$$

In particular, explain *in terms of the definition of "basis"* why the calculation you did shows that the set is or is not a basis.

4. (*5 pts*) Compute $P_{S \leftarrow T}$ if

$$S = \left\{ \begin{bmatrix} \boxed{10} \\ 2 \\ 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 4 \\ 3 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ -1 \\ -1 \\ -1 \end{bmatrix} \right\}, \qquad T = \left\{ \begin{bmatrix} 16 \\ 2 \\ 3 \\ 13 \end{bmatrix}, \begin{bmatrix} 5 \\ 11 \\ 10 \\ 8 \end{bmatrix}, \begin{bmatrix} 9 \\ 7 \\ 6 \\ 12 \end{bmatrix}, \begin{bmatrix} 4 \\ 14 \\ 15 \\ 3 \end{bmatrix} \right\}$$

are ordered bases of R^4.