Name _____

Math 308E
Winter 2016

Midterm 2
February 26, 2016

Instructions

- Point totals for each problem are shown in parentheses.

- You must show all your work on the examination to receive credit. You must also use the techniques of this course on each problem, but you may not use determinants on this test. Ask if you are not sure about what is permitted.

- Read each problem carefully. You will not receive credit if you misunderstand or misread a problem.

- Your work must be neat and organized.

- Be very careful with your arithmetic. None of the calculations or answers are too complicated.

- Make sure your test has 6 questions.

(3)   1. Let $A = \begin{bmatrix} 0 & 1 \\ -1 & 2 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 4 \\ 6 & 2 & 1 \end{bmatrix}$. Compute AB if the product exists. If the product does not exist write DNE.

(5)   2. Find the inverse of the matrix

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

If the matrix does not have an inverse, indicate why.

(5)   3. Let $\mathbf{v}_1 = (2, 3, 1)$ and $\mathbf{v}_2 = (3, 6, 2)$. Expand $\{\,\mathbf{v}_1, \mathbf{v}_2\,\}$ to a basis for $\mathbf{R}^3$. You must explain how you know that you have found a basis; it is not sufficient to just write down a vector.

(5) 4. Find a basis for the null space of the matrix

$$\begin{bmatrix} 1 & 0 & -2 & 1 & -1 \\ 2 & 1 & -4 & 4 & -1 \\ 0 & -1 & 0 & -1 & 2 \end{bmatrix}.$$

(3)   5. Find a 3×2 matrix A and a 2×3 matrix B such that AB is invertible or explain why such matrices cannot exist.

(3)   6. Find a 3×3 matrix A and a 3×3 matrix B, each with nullity equal to 1, such that AB is the 0 matrix, or explain why such matrices cannot exist.