Practice Test 4E for Calculus II, Math 1502, November 10, 2012

Name:

Section:

Name of TA:

This test is to be taken without calculators and notes of any sorts. The allowed time is 50 minutes. Provide exact answers; not decimal approximations! For example, if you mean $\sqrt{2}$ do not write $1.414\ldots$. Show your work, otherwise credit cannot be given.
Write your name, your section number as well as the name of your TA on EVERY PAGE of this test. This is very important.

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I: (20 points) Consider the matrices

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

For each matrix compute the rank and decide whether the matrix is invertible. If it is, find the inverse.

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II: (20 points) a) Find a basis for the Null space of the matrices

$$C = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 2 & 3 & 2 & 3 \end{bmatrix} , \; D = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$$

b) What is the rank of these matrices?

c) Find a basis for the column space of these matrices.

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III: (20 points) Diagonalize the matrix

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

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IV: (20 points) a) Find the eigenvalues and their algebraic multiplicity for the matrices below. Diagonalize them if possible.

$$A = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{bmatrix}$$

b) Find a matrix B so that $B^2 = A$ where

$$A = \begin{bmatrix} 1 & -2 \\ 0 & 9 \end{bmatrix}$$

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V: (20 points) Find a closed form for A^k where

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