Test 3 for Calculus II, Math 1502 G1-G5 , October 26, 2010

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.

Name:

Section:

Name of TA:

I: Consider the vectors $\vec{a} = \begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}$ and $\vec{b} = \begin{bmatrix} 4 \\ 3 \\ 0 \end{bmatrix}$.

a) (6 points) Calculate $\vec{a} - \vec{b}$.

b) (9 points) Calculate $|\vec{a} + \vec{b}|$.

c) (10 points) Calculate the angle between $\vec{a}$ and $\vec{b}$.

Name:

Section:

Name of TA:

II: a) (8 points) Calculate the inverse of the matrix

$$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix} .$$

b) (8 points) Compute the matrix product $A^T A$ where

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

c) (9 points) Let $f : \mathcal{R}^2 \to \mathcal{R}^2$ be a linear transformation with

$$f\left(\begin{bmatrix} 1 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \ , \ f\left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

Find the matrix A_f associated with f.

Name:

Section:

Name of TA:

III: a) (10 points) Find the plane in $\mathcal{R}^3$, in parametrized form, that passes through the points given by the tips of the vectors $\vec{e}_1, \vec{e}_2, \vec{e}_3$.

b) (15 points) A plane is given in parametrized form by

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + s \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} + t \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$

Find an equation for this plane.

Name:

Section:

Name of TA:

IV: Consider the system of equations

$$x - 2y + az = 2$$

$$x + y + z = 0$$

$$3y + z = 2$$

a) (15 points) For which values of a, if any, does this system have a unique solution? Find the solution for any such value of a.

b) (5 points) For which value of a, if any, does this system have infinitely many solutions?

c) (5 points) For which value of a, if any, does this system have no solutions?