MATH 260, Midterm Test, Fall '14
October 6, 2014

Name:

Section:

READ THESE DIRECTIONS:

- **There are 6 problems, 5 total pages, 100 points on this test.**
- **Write your answers on this copy of the exam. If you need more space, use the back of these sheets but clearly identify what problem it refers to.**
- **You must show your work. Unjustified answers may not receive full credit.**
- **Even if you can't finish a problem, write down what you can! You may receive partial credit.**
- **When you've finished the test, bring it to me (in my office).**
- **Authorized aid: Your brain.**
- **Un-authorized aid: Anything not listed as authorized aid. This includes calculators, notes, books, cell phones (FOR ANY REASON), etc.**

Honor Code:

1) (20 pts) Give an example of...

a) a 3×3 matrix with rank 2.

b) a 2×2 matrix with determinant 6.

c) a 2×2 matrix that is singular.

d) a linear system with infinitely many solutions (NOT its augmented matrix).

2) (10 pts) Consider the linear system whose augmented matrix is of the form

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

For what values of a, if any, will the system...

a) have a unique solution?

b) have infinitely many solutions?

c) be inconsistent?

3) (20 pts) For the following linear system, give the augmented matrix and solve the system using Gauss-Jordan elimination (that is, get it into RREF first).

$$\begin{array}{rcrcrcl} x_1 & + & x_2 & & & = & 1 \\ & & 3x_2 & + & 3x_3 & = & 6 \\ -x_1 & + & 3x_2 & + & 5x_3 & = & 7 \end{array}$$

4) (15 pts) Evaluate the following if the operation is defined. If it is not, say why.

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

a) $A + B^T$

b) BA

c) BC

5) (15 pts) Find the inverse of the matrix if it is invertible. Otherwise, show that the matrix is singular.

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

6) Evaluate the following determinants.

a) (8 pts) $\begin{vmatrix} 1 & 1 & 1 \\ 4 & 0 & 3 \\ 2 & 1 & 1 \end{vmatrix}$

b) (12 pts) $\begin{vmatrix} 1 & 1 & 1 & 1 \\ 0 & 4 & 0 & 3 \\ 0 & 2 & 1 & 1 \\ 2 & 2 & 2 & 1 \end{vmatrix}$