Math 118 Sample Final

The final is cumulative and will cover all topics from the course!

See the practice problems for the two midterms for examples of problems from Set 1 through Set 10. The problems below are practice problems for the exercises covering topics found in Set 11 through 13 only. They are just for practice and will not be collected.

1. Solve the following systems of equations or state that there is no solution:

a. $\begin{cases} 2x + 3y = 1 \\ 3x - 2y = 3 \end{cases}$

b. $\begin{cases} 2x + 3y + z = 2 \\ 3x - y + z = 3 \\ 4x - z = 3 \end{cases}$

c. $\begin{cases} 2x + 3y + w = 1 \\ x - y + z + w = 2 \\ 4x - z = 1 \\ x - y = 3 \end{cases}$

2. Perform the matrix operation or state that the operation cannot be done:

a. $\begin{bmatrix} 1 & -1 & 3 & 2 \\ 0 & 2 & 1 & -3 \end{bmatrix} \begin{bmatrix} 1 & 4 \\ 1 & 1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 4 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 3 & 2 \\ 0 & 2 & 1 & -3 \end{bmatrix}$

c. $\begin{bmatrix} 1 & 4 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & -1 \end{bmatrix}^3$

d. $\begin{bmatrix} 2 & -3 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

e. $\begin{bmatrix} x & y & z \end{bmatrix} \begin{bmatrix} 2 & -3 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

3. Write the following systems as a matrix multiplication of the form $A\mathbf{x} = \mathbf{b}$ and then solve using the inverse matrix:

a. $\begin{cases} -2x + 2y = 1 \\ 3x - y = 1 \end{cases}$

b. $\begin{cases} -2x + 2y = 1 \\ x - 2y = 4 \end{cases}$

4. Calculate the determinant of the matrices shown below. Do these matrices have inverses?

a. $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

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

c. $\begin{bmatrix} a & 0 & 0 & 0 \\ b & c & 0 & 0 \\ d & e & f & 0 \\ g & h & i & j \end{bmatrix}$