Math 207 Section A: Test 1

- Paper will be provided to you
- Do one problem per each side of the page
- Put your full name on each page
- Non-graphing calculators are allowed
- Show all work and enclose final answer in a box

1. (15 points) Find the solution to the following system of equations

$$\begin{aligned} x_1 + 2x_2 - 3x_3 + 3x_4 &= -5 \\ -2x_1 - 4x_2 + 8x_3 - 6x_4 &= 14 \end{aligned}$$

2. (10 points) Let

$$A = \begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$$

and

$$\mathbf{b} = \begin{bmatrix} h \\ -6 \end{bmatrix}$$

(a) Determine the value(s) of h such that the system $A\mathbf{x} = \mathbf{b}$ is consistent

(b) Is the matrix A invertible? Why or why not?

3. (15 points) Determine the polynomial function whose graph passes through the given points: $(1, -1), (2, -2), (3, 1)$

4. (12 points) Let

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

Compute the following (if possible). If the operation is not possible, explain why.

(a) 3A-B (b) AB (c) AB^T (d) det(A)

5. (20 points) Find the LU factorization for

$$A = \begin{bmatrix} 2 & 2 & 0 \\ -4 & 1 & 3 \\ 4 & 4 & 3 \end{bmatrix}$$

6. (10 points) Find the determinant of

$$A = \begin{bmatrix} -1 & 2 & 8 & 1 & 1 \\ 3 & 0 & 1 & -2 & 1 \\ 0 & 0 & 2 & 1 & 0 \\ 0 & 0 & -1 & 2 & 0 \\ 0 & 0 & 1 & -4 & 1 \end{bmatrix}$$

7. (8 points) Suppose

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 4$$

Find the determinants of

(a)

$$\begin{vmatrix} d & e & f \\ a & b & c \\ g & h & i \end{vmatrix}$$

(b)

$$\begin{vmatrix} a & b & c \\ 3d+2a & 3e+2b & 3f+2c \\ g & h & i \end{vmatrix}$$

8. (10 points) Use Cramer's Rule to solve (no credit will be given if another method is used)

$$\begin{bmatrix} -1 & -3 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 7 \\ -8 \end{bmatrix}$$