Name: _____

MATH 108
Spring 2022
Written HW 4: Due 02/21

"You are braver than you believe, stronger than you seem, and smarter than you think."
– Christopher Robin, Winnie the Pooh

Problem 1. (10pt) The following augmented matrix is in reduced-row echelon form. Determine the solutions (if any).

$$\begin{pmatrix} 1 & 0 & -1 & 2 & 5 \\ 0 & 1 & 0 & 0 & -4 \end{pmatrix}$$

Problem 2. (10pt) The following augmented matrix is in reduced-row echelon form. Determine the solutions (if any).

$$\begin{pmatrix} 1 & 0 & 0 & -5 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Problem 3. (10pt) The following augmented matrix is in reduced-row echelon form. Determine the solutions (if any).

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 4 \\ 0 & 1 & 0 & 0 & -5 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \end{pmatrix}$$

Problem 4. (10pt) Compute the following determinant:

$$\det \begin{pmatrix} 1 & -1 & 1 & 4 \\ 2 & 1 & 0 & 2 \\ 3 & 0 & 0 & -1 \\ 4 & 2 & -3 & 0 \end{pmatrix}$$

Problem 5. (10pt) Consider the following system of equations:

$$\begin{cases} 2x + 3y = 0 \\ -x - 2y = 1 \end{cases}$$

(a) Show that the coefficient matrix has an inverse.

(b) Find the inverse of the coefficient matrix.

(c) Use the coefficient to solve the system of equations.

Problem 6. (10pt) Show that the matrix B is the inverse to A:

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

$$B = \frac{1}{2} \begin{pmatrix} 1 & -1 & 0 \\ -1 & 1 & 1 \\ 1 & 1 & 0 \end{pmatrix}$$

Problem 7. (10pt) Compute the following:

(a) $-3\begin{pmatrix} 1 & -1 \\ 0 & 3 \end{pmatrix}$

(b) $\begin{pmatrix} 1 & -1 & 5 \\ 3 & 0 & 4 \end{pmatrix} - \begin{pmatrix} 0 & 5 & -6 \\ 1 & 1 & -2 \end{pmatrix}$

(c) $\begin{pmatrix} 1 & 0 \\ -1 & 2 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} -1 & 4 \\ 0 & 1 \end{pmatrix}$