QUIZ 3 - MATH 305 YOUR NAME:____

Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Write a vector equation equivalent to the system

$$\left\{\begin{array}{rrrr} -2x_1 + 8x_2 + x_3 &=& 5\\ 3x_1 + 5x_2 - 6x_3 &=& 12 \end{array}\right\}.$$

(b) Write a matrix equation equivalent to the vector equation

$$5\begin{bmatrix}5\\-2\end{bmatrix}-1\begin{bmatrix}1\\-7\end{bmatrix}+3\begin{bmatrix}-8\\3\end{bmatrix}-2\begin{bmatrix}4\\-5\end{bmatrix}=\begin{bmatrix}-8\\16\end{bmatrix}.$$

2. Let
$$\boldsymbol{a}_1 = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$$
, $\boldsymbol{a}_2 = \begin{bmatrix} 6 \\ -5 \\ 3 \end{bmatrix}$, $\boldsymbol{b} = \begin{bmatrix} -2 \\ 5 \\ -1 \end{bmatrix}$. Write \boldsymbol{b} as a linear combination of $\boldsymbol{a}_1, \boldsymbol{a}_2$, if possible.

3. Let $A = \begin{bmatrix} 5 & -3 \\ -10 & 6 \end{bmatrix}$ and $\boldsymbol{b} = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$. Does $A\boldsymbol{x} = \boldsymbol{b}$ have a solution for all \boldsymbol{b} ? If not, for which \boldsymbol{b} does it have a solution?