Name

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

1. Rewrite the following system of linear equations as a matrix equation in the form $AX = B$ making sure to write out each matrix explicitly.

$$\begin{cases} 4x_1 + 3x_2 - x_3 = -10 \\ 2x_1 + x_2 - 3x_3 = -6 \end{cases}$$

$$\begin{pmatrix} 4 & 3 & -1 \\ 2 & 1 & -3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} -10 \\ -6 \end{pmatrix}$$

2. Check that $\begin{cases} x_1 = 4t - 4 \\ x_2 = 2 - 5t \\ x_3 = t \end{cases}$ is the correct solution set for the system in #1 by multiplying the

coefficient matrix A by $\begin{pmatrix} 4t - 4 \\ 2 - 5t \\ t \end{pmatrix}$ and simplifying the result.

$$\begin{pmatrix} 4 & 3 & -1 \\ 2 & 1 & -3 \end{pmatrix} \begin{pmatrix} 4t - 4 \\ 2 - 5t \\ t \end{pmatrix} = \begin{pmatrix} 4 \cdot (4t - 4) + 3 \cdot (2 - 5t) - 1 \cdot t \\ 2 \cdot (4t - 4) + 1 \cdot (2 - 5t) - 3 \cdot t \end{pmatrix} = \begin{pmatrix} 16t - 16 + 6 - 15t - t \\ 8t - 8 + 2 - 5t - 3t \end{pmatrix} = \begin{pmatrix} -10 \\ -6 \end{pmatrix}$$

3. (BONUS: 5 points)   What values of a and b make the following matrix equation correct?

$$\begin{pmatrix} 1 & 2 \end{pmatrix} \begin{pmatrix} a & 3 \\ 4 & b \end{pmatrix} = \begin{pmatrix} 1 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 2 \end{pmatrix} \begin{pmatrix} a & 3 \\ 4 & b \end{pmatrix} = \begin{pmatrix} 1 \cdot a + 2 \cdot 4 & 1 \cdot 3 + 2 \cdot b \end{pmatrix} = \begin{pmatrix} a + 8 & 3 + 2b \end{pmatrix} = \begin{pmatrix} 1 & 2 \end{pmatrix}$$

$$\Rightarrow \begin{array}{c} a + 8 = 1 \\ 3 + 2b = 2 \end{array} \Rightarrow \boxed{\begin{array}{c} a = -7 \\ b = -0.5 \end{array}}$$