1.(1 pt) You'll need to use the formatted text mode in order to do this problem: click the "formatted text" button on the bottom of the page and then click "submit answer".
If $T : \mathrm{R}^3 \to \mathrm{R}^3$ is a linear transformation such that

$$T\left(\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} -3 \\ -4 \\ 1 \end{bmatrix}, \quad T\left(\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} 3 \\ -1 \\ -4 \end{bmatrix},$$

and

$$T\left(\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 3 \\ 2 \\ -2 \end{bmatrix},$$

then

$$T\left(\begin{bmatrix} 4 \\ 0 \\ -3 \end{bmatrix}\right) = \begin{bmatrix} __ \\ __ \\ __ \end{bmatrix}$$

2.(1 pt) You'll need to use the formatted text mode in order to do this problem: click the "formatted text" button on the bottom of the page and then click "submit answer".
If $T : \mathrm{R}^2 \to \mathrm{R}^2$ is a linear transformation such that

$$T\left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} -6 \\ -10 \end{bmatrix}, \text{ and } T\left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} -10 \\ -6 \end{bmatrix},$$

then the standard matrix of T is

$$A = \begin{bmatrix} __ & __ \\ __ & __ \end{bmatrix}$$

3.(1 pt) You'll need to use the formatted text mode in order to do this problem: click the "formatted text" button on the bottom of the page and then click "submit answer".
Let

$$b_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \quad b_2 = \begin{bmatrix} -3 \\ -7 \end{bmatrix}.$$

The set $B = \{b_1, b_2\}$ is a basis for R^2.
Let $T : \mathrm{R}^2 \to \mathrm{R}^2$ is a linear transformation such that $T(b_1) = 3b_1 + 5b_2$, and $T(b_2) = 7b_1 + 4b_2$.
Then the matrix of T relative to the basis B is

$$[T]_B = \begin{bmatrix} __ & __ \\ __ & __ \end{bmatrix}$$

and the matrix of T relative to the standard basis E for R^2 is

$$[T]_E = \begin{bmatrix} __ & __ \\ __ & __ \end{bmatrix}$$

4.(1 pt)
If $T : P_1 \to P_1$ is a linear transformation such that
$T(1+5x) = -3-3x$ and $T(4+19x) = -2-3x$, then
$T(-2-5x) =$_____ $+$_____ x.

5.(1 pt) You'll need ot use the formatted text mode in order to do this problem: click the "formatted text" button on the bottom of the page and then click "submit answer".
The matrices

$$A_1 = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \quad A_2 = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix},$$

$$A_3 = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \text{ and } A_2 = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix},$$

form a basis for the vector space $V = M_2R$.
Write the matrix of the linear transformation $T : M_2R \to M_2R$ such that $T(A) = 11A + 4A^T$ relative to this basis:

$$\begin{bmatrix} __ & __ & __ & __ \\ __ & __ & __ & __ \\ __ & __ & __ & __ \\ __ & __ & __ & __ \end{bmatrix}$$

6.(1 pt) A linear transformation $T : R^3 \to R^2$ whose matrix is

$$\begin{bmatrix} -1 & -5 & -2 \\ -2 & -10 & 3.5+k \end{bmatrix}$$

is onto if and only if $k \neq$_____ .

7.(1 pt) The matrix

$$A = \begin{bmatrix} 4 & -1 & -4 & 4 \\ 2 & -1.5 & -2 & 2 \\ -2 & -0.5 & 2 & 3 \end{bmatrix}$$

is a matrix of a linear transformation $T : R^k \to R^n$ where $k =$_____ and $n =$_____ , $\dim(\mathrm{Ker}(T)) =$_____ , $\dim(\mathrm{Range}(T)) =$_____ .
Is T onto? (enter YES or NO) _____
Is T one-to-one? (enter YES or NO) _____

8.(1 pt) Let

$$A = \begin{bmatrix} 2 & 4 \\ 3 & 3 \\ -1 & 1 \end{bmatrix} \text{ and } b = \begin{bmatrix} 10 \\ 6 \\ 4 \end{bmatrix}$$

A linear transformation $T : \mathrm{R}^2 \to \mathrm{R}^3$ is defined by $T(x) = Ax$, then find an $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ in R^2 whose image under T is b.
$x_1 =$ _____
$x_2 =$ _____