Math02B Assignment 5.4 Last Name_______________1st_________

Give complete solutions to the following problems. Be sure to provide all the necessary steps to support your answers.

1. Let $D=\{d_1,d_2\}$ *and* $B=\{b_1,b_2\}$ be bases for vector spaces V and W, respectively.
Let $T:V\rightarrow W$ be a linear transformation with the property that
$T(d_1)=2b_1-3b_2,\ \ T(d_2)=-4b_1+5b_2$
Find the matrix for T relative to D and B.

2. Let $T:\mathbb{P}_2\rightarrow\mathbb{P}_4$ be the transformation that maps a polynomial **p**(t) into the polynomial $p(t)+t^2p(t)$

a. Find the image of $p(t)=2-t+t^2$

b. Show that T is a linear transformation.

c. Find the matrix for T relative to the bases $\{1,t,t^2\}$ and $\{1,t,t^2,t^3,t^4\}$

3. Let B $=\{\mathbf{b}_1,\mathbf{b}_2,\mathbf{b}_3\}$ be a basis for a vector space V. Find T($3\mathbf{b}_1 - 4\mathbf{b}_2$) when T is a linear transformation from V to V whose matrix relative to B is

$$[T]_B = \begin{bmatrix} 0 & -6 & 1 \\ 0 & 5 & -1 \\ 1 & -2 & 7 \end{bmatrix}$$

4. Find the B-matrix for the transformation **x** -----> A**x** when B=$\{\mathbf{b}_1,\mathbf{b}_2,\mathbf{b}_3\}$.

$$\mathbf{A} = \begin{bmatrix} -14 & 4 & -14 \\ -33 & 9 & -31 \\ 11 & -4 & 11 \end{bmatrix}, \mathbf{b}_1 = \begin{bmatrix} -1 \\ -2 \\ 1 \end{bmatrix}, \mathbf{b}_2 = \begin{bmatrix} -1 \\ -1 \\ 1 \end{bmatrix}, \mathbf{b}_3 = \begin{bmatrix} -1 \\ -2 \\ 0 \end{bmatrix}$$

5. Let T be a transformation who's a standard matrix is given below. Find a Basis for $\Re^3$ with the property that $[T]_B$ is diagonal.

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