Math02B Assignment 4.1 Last Name_______________1st_________

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

1. Let H be the set of all vectors of the form

$$\begin{bmatrix} 2t \\ 0 \\ -t \end{bmatrix},$$ Show that H is a subspace of $\mathbb{R}^3$

2. Let $v_1 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, v_2 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, v_3 = \begin{bmatrix} 4 \\ 2 \\ 6 \end{bmatrix}, w = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix},$

a. Is **w** in $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$?.

b. How many linearly independent vectors in $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$?

c. Is **w** in the subspace spanned by $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$? Prove your answer.

3. let W be the set of all vectors of the form shown, where a, b, and c represent arbitrary real numbers. In each case, either find a set S of vectors that spans W or give an example to show that W is not a vector space.

i. $\begin{bmatrix} 3a+b \\ 4 \\ a-5b \end{bmatrix}$, *ii.* $\begin{bmatrix} -a+1 \\ a-6b \\ 2a+b \end{bmatrix}$

4. Determine if the set H of all matrices of the $\begin{bmatrix} a & b \\ 0 & c \end{bmatrix}$ is a vector subspace of $M_{2?2}$, where a, b and c are real numbers.

5. Prove that All polynomials of degree less than or equal to three, with integers as coefficients form a vector subspace of the vector space of continuous functions on (-∞, ∞)