Exam #3

Name: ______________
Point values are indicated to the right of each question. SHOW ALL YOUR WORK!!!!

# 1.) Let $V$ be the set of vectors of the form $(a, b, 4a + 5b)$
Determine whether $V$ is a subspace of $\mathbb{R}^3$ (10)

# 2.) Is $(5,4,2)$ a linear combination of $(1,2,3)$, $(0,1,4)$ and $(2,3,6)$? Show why/why not. (10)
# 3.) Determine whether or not the following set of vectors is linearly independent or linearly dependent:

\( \{(1, -2, 3), (-2, 4, 1), (-4, 8, 9)\} \)
# 4.) compute the rank of the following matrices.

(a) \[ A = \begin{bmatrix} 1 & 3 \\ 0 & 2 \\ 1 & 5 \\ 1 & 1 \end{bmatrix} \]  
(b) \[ \begin{bmatrix} 1 & 3 & 1 \\ 0 & 2 & 1 \\ 1 & 5 & 1 \\ 1 & 1 & 1 \end{bmatrix} \]

(c) If the matrix given in part (a) is the coefficient matrix to a system of linear equations and the matrix given in part (b) is the augmented matrix associated with that system then, referring to your answer for the rank in part a and b, what type of solutions do you expect and why? YOU MUST REFER TO THE RANKS you derived in parts a and b.
# 5.) Show that the following set of vectors span all of $\mathbb{R}^2$:
\{(1, 1), (1, -1)\}

# 6.) Now that you've done #5, show whether or not $\{(1, 1), (1, -1)\}$ is a basis for $\mathbb{R}^2$
# 7.) Give a DEFINITION for (not a method for computing) the rank of a matrix. (10)

# 8.) **DESCRIBE** the row space for the following 1 x 2 matrix

\[ \begin{bmatrix} 2 & 2 \end{bmatrix} \]