Assignment - 2 (Linear Algebra)

1. Express $(5,2,1)$ as a linear combination of $(1,4,0)$, $(2,2,1)$ and $(3,0,1)$.

2. Prove that $(4,3,5)$ can not be expressed as linear combination of $(0,1,3)$ and $(2,1,1)$ though these three vectors are linearly dependent.

3. Show that the vectors $(2,3,1)$, $(2,1,3)$ and $(1,1,1)$ are linearly dependent.

4. Determine k so that the vectors $(1,3,1)$ $(2,k,0)$ & $(0,4,1)$ are linearly independent.

5. If $\{\alpha, \beta, \delta\}$ is linearly independent in $\mathbb{R}^n$ prove that $\{\alpha + c\beta, \beta, \delta\}$ is independent in $\mathbb{R}^n$.

6. Find the spanning set of the sub set
$$S = \{(x,y,z) \in \mathbb{R}^3 : 2x + y - z = 0\}$$

7. Show that $W = \{(x,y,z) \in \mathbb{R}^3 : 2x - y + 3z = 0\}$ is a subset of $\mathbb{R}^3$. Find a spanning set which is independent of W.

8. Solve the vector $\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$ from the following vector equation
$$x_1 \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} + x_2 \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix} + x_3 \begin{pmatrix} -1 \\ 3 \\ 3 \end{pmatrix} = \begin{pmatrix} -9 \\ -2 \\ 9 \end{pmatrix}.$$