**1.**. Is the set $\left\{ \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix} \right\}$ a linearly independent subset of $\mathbb{R}^2$.

**2.** Determine whether the given vectors are linearly independent or linearly dependent in $\mathbb{R}^3$

$$\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \\ 6 \end{bmatrix}$$

**3.** Check whether the following vectors forms a basis of $\mathbb{R}^2$ or not.

$$\left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix} \begin{bmatrix} 1 \\ 4 \end{bmatrix} \right\}$$

and if it is basis of $\mathbb{R}^2$ then write for any arbitrary vector $\begin{bmatrix} a \\ b \end{bmatrix}$ of $\mathbb{R}^2$ in the linear combination of $\left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix} \begin{bmatrix} 1 \\ 4 \end{bmatrix} \right\}$.

**4.** Suppose $\{v_1, v_2, v_3, v_4\}$ points lies on the line in $\mathbb{R}^2$ then show that set $\{v_2 - v_1, v_4 - v_3\}$ is linearly dependent subset of $\mathbb{R}^2$ .

**5.** let

$$W = \{(x, y, z) | x + y + z = 0\}$$

show that $W$ is a vector space over field $\mathbb{R}$ and find its basis and dimension.