Tutorial Worksheet (WL1.1, WL1.2 & WL2.1)
(Definition of vector spaces and its examples, Concept of linear dependence/independence vectors, Basis and dimension of vector spaces and its examples, properties of basis

Name and section: ______________________________

Instructor's name: ______________________________

1. Show that $V = \{(x, y, 0)|x, y \in \mathbb{R}\}$ form a vector space over the field $\mathbb{R}$.

2. Check whether it is vector space or not .

$$V = \{ax^2 + bx + c \ |a, b \in \mathbb{R} \text{ and } c = 1\}$$

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

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

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

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

6. 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 $\mathbb{R}^2$.

7. 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.