Matrix Theory (EE5609) Assignment 2

Arkadipta De
MTech Artificial Intelligence
Roll No - AI20MTECH14002

***Abstract*—This assignment finds the equation of a straight line given two points on that line.**

1 Problem Statement

Find the equation of the line passing through the origin and the point $\begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix}$.

2 Solution

Let the points be $\mathbf{O}=\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ which is the origin and $\mathbf{P}=\begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix}$.

The vector form of the line passing through **O** and **P**, which is the line passing through the point **O** and along direction vector **A** is given by

$$\mathbf{r} = \mathbf{O} + k\mathbf{A} \tag{2.0.1}$$

$$\implies \mathbf{r} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} + k\begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix} \tag{2.0.2}$$

$$\implies \mathbf{r} = k\begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix} \tag{2.0.3}$$

where k is a constant multiple.

Python Code: The code for generating the Figure 1 can be found at https://github.com/Arko98/EE5609/blob/master/Assignment_2/Codes/Figure.py

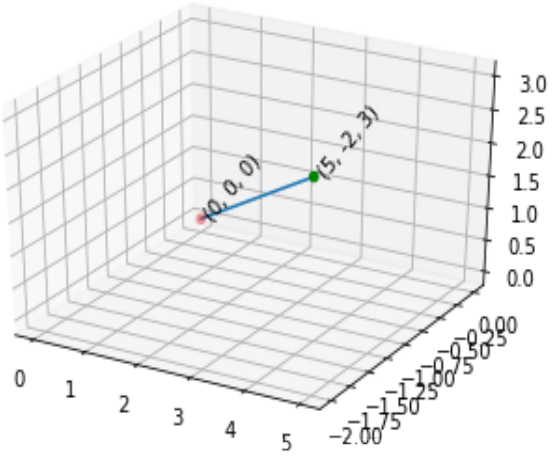

Fig. 1: Line passing through origin and point (5,-2,3)