

Assignment 2

Venkatesh E
AI20MTECH14005

Abstract—This document explains the concept of finding the equation of line passing through the points

Download all latex-tikz codes from

https://github.com/venkateshelangovan/IIT-Hyderabad-Assignments/tree/master/Assignment2_Matrix_Theory

1 PROBLEM

Find the equation of the line passing through the points $\begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -2 \\ 6 \end{pmatrix}$

2 EQUATION OF THE LINE PASSING THROUGH TWO POINTS

Consider the two points, a and b in 3-Dimensional co-ordinates,

Parametric equation of the line passing through two points a and b is given by,

$$\mathbf{x} = \mathbf{a} + \lambda(\mathbf{A}) \quad (2.0.1)$$

Where ,Direction Vector, $\mathbf{A}=\mathbf{b}-\mathbf{a}$

3 SOLUTION

Let ,

$$\mathbf{a} = \begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 3 \\ -2 \\ 6 \end{pmatrix} \quad (3.0.1)$$

Direction vector A of the points a and b is given by,

$$\mathbf{A} = \mathbf{b} - \mathbf{a} = \begin{pmatrix} 0 \\ 0 \\ 11 \end{pmatrix} \quad (3.0.2)$$

Parametric equation is given by,

$$\mathbf{x} = \begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 0 \\ 11 \end{pmatrix} \quad (3.0.3)$$

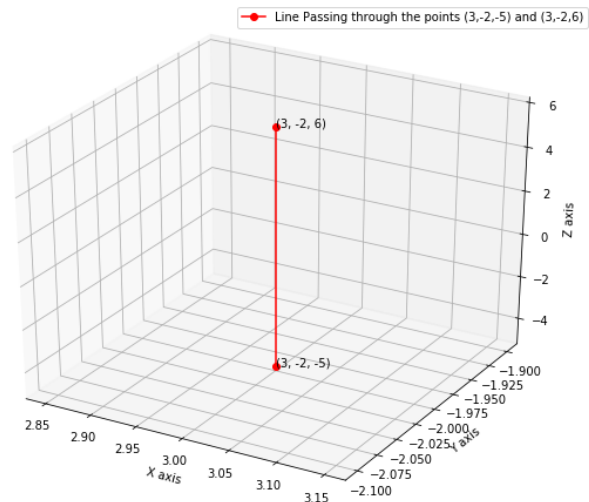


Fig. 1: Line passing through the points (3,-2,-5) and (3,-2,6)

Result :

Equation of the line passing through points a and b is given by:

$$\mathbf{x} = \begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 0 \\ 11 \end{pmatrix} \quad (3.0.4)$$