Matrix theory - Assignment2

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Abstract—**This document illustrates equation of a line passing through a point and in direction of a vector**

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1 Problem

Find the equation of the line which passes through the point $\begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix}$ and parallel to the line given by

$$\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6} \tag{1.0.1}$$

2 Construction

We know that equation of the line passing through given a point a and in a parallel to **b** is given by

$$\mathbf{r} = \mathbf{a} + \lambda\mathbf{b} \tag{2.0.1}$$

Also we can find direction vector from the cartesion form of equation

$$\frac{x-x_1}{a} = \frac{y-y_1}{b} = \frac{z-z_1}{c} \; is \; \begin{pmatrix} a \\ b \\ c \end{pmatrix} \tag{2.0.2}$$

3 Solution

So the direction vector of equation given is

$$\mathbf{b} = \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \tag{3.0.1}$$

and the point on which line passes is

$$\mathbf{a} = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix} \tag{3.0.2}$$

So from parameteric form of equation, equation of line is

$$r = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \tag{3.0.3}$$
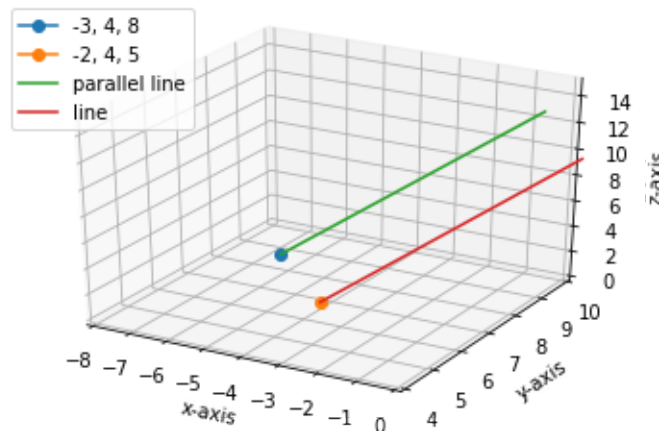

Fig. 0: Equation of line passing through a and parallel to b