Matrix Theory: Assignment 1

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***Abstract*- This assignment solves a problem to find the slope of a line.**

1 Problem Statement

Find the slope of a line, which passes through the origin, and the mid-point of the line segment joining the points $P = \begin{pmatrix} 0 \\ -4 \end{pmatrix}$ and $B = \begin{pmatrix} 8 \\ 0 \end{pmatrix}$.

2 Theory

The midpoint of two points $X = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ and $Y = \begin{pmatrix} y_1 \\ y_2 \end{pmatrix}$ is given by

$$\frac{1}{2}\left\{ \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} y_1 \\ y_2 \end{pmatrix} \right\} \tag{1}$$

Slope of a line joining any two points X and Y is given by

$$m = \frac{y_2 - y_1}{x_2 - x_1} \tag{2}$$

3 Solution

We are given two points P and B. Let their mid-point be denoted by Q.

$$\therefore Q = \frac{1}{2}\left\{ \begin{pmatrix} 0 \\ -4 \end{pmatrix} + \begin{pmatrix} 8 \\ 0 \end{pmatrix} \right\}$$

$$= \begin{pmatrix} 4 \\ -2 \end{pmatrix}$$

We know, Origin=(0,0).
Now, using(2), slope of the line passing through the origin and Q is

$$m = \frac{-2-0}{4-0} = -\frac{1}{2}$$