

Assignment 1: Matrix Theory

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

Download all python codes from

https://github.com/Debolena/EE5609/blob/master/Assignment1/assignment1_python.py

and latex-tikz codes from

https://github.com/Debolena/EE5609/blob/master/Assignment1/latex_code.tex

Now using (2.0.3), (2.0.5) and (2.0.6),

$$\begin{pmatrix} 4 \\ -2 \end{pmatrix} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (2.0.7)$$

$$\Rightarrow \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (2.0.8)$$

$$\Rightarrow \begin{pmatrix} 1 \\ -\frac{1}{2} \end{pmatrix} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (2.0.9)$$

Thus, by comparing, we have,

$$m = -\frac{1}{2} \quad (2.0.10)$$

1 PROBLEM

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

2 SOLUTION

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

$$\therefore \mathbf{Q} = \frac{\mathbf{P} + \mathbf{B}}{2} \quad (2.0.1)$$

$$= \frac{1}{2} \left[\begin{pmatrix} 0 \\ -4 \end{pmatrix} + \begin{pmatrix} 8 \\ 0 \end{pmatrix} \right] \quad (2.0.2)$$

$$= \begin{pmatrix} 4 \\ -2 \end{pmatrix} \quad (2.0.3)$$

We know, \mathbf{O} = Origin= (0,0)

Hence, the directional vector is:

$$\mathbf{m} = \mathbf{Q} - \mathbf{O} \quad (2.0.4)$$

$$= \mathbf{Q}, \quad \because \mathbf{O} = \mathbf{0} \quad (2.0.5)$$

The direction vector can be expressed in terms of the slope as

$$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (2.0.6)$$