PYTHON PROGRAMMING ON MATRICES

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FWC22045 IITH Future Wireless Communication (FWC) Matrix:Lines

1 Problem

Find the angle between x-axis and the line joining points (3,-1) and (4,-2)

2 Solution

Given that:

$$\mathbf{P} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

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

Finding the directive vector and assigning it to C

$$\mathbf{C} = \mathbf{P} - \mathbf{Q}$$

$$\mathbf{C} = \begin{pmatrix} 3 \\ -1 \end{pmatrix} - \begin{pmatrix} 4 \\ -2 \end{pmatrix}$$

$$\mathbf{C} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$$

Now consider a vector (1,0) along x-axis and assign it to x

$$\mathbf{x} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

By using the formula we can find the angle

$$cos\theta = \frac{\mathbf{C}^T\mathbf{X}}{||\mathbf{C}||||\mathbf{X}||}$$

$$\theta = 135^\circ$$

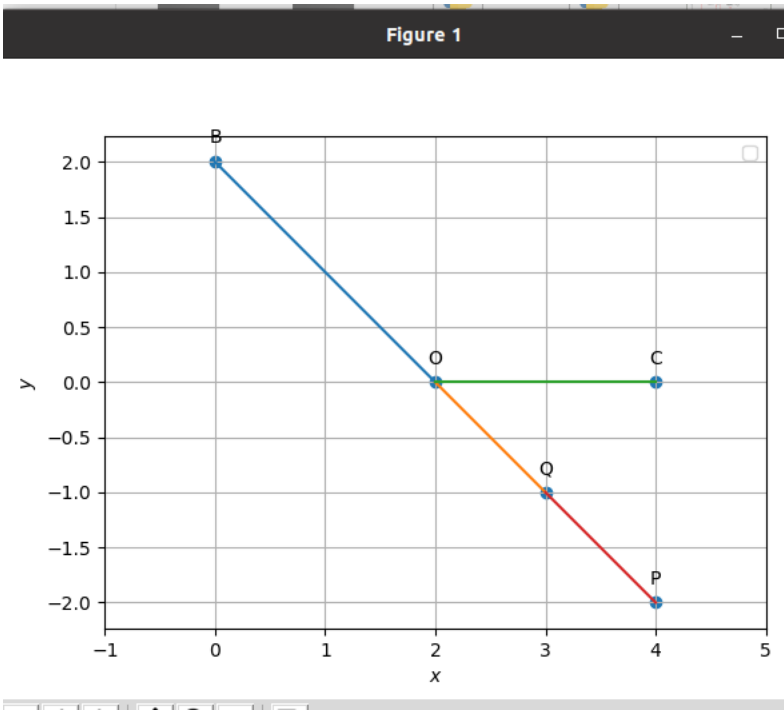

Figure 1: line assignment