4.3.14

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Question A line intersects the Y axis and X axis at the points **P** and **Q**, respectively. If $(2,5)$ is the mid-point of PQ, then the coordinates of **P** and **Q** are

Solution:

Let us solve the given equation theoretically and then verify the solution computationally. Let,

$$\mathbf{P} = \begin{pmatrix} 0 \\ a \end{pmatrix} \quad and \quad \mathbf{Q} = \begin{pmatrix} b \\ 0 \end{pmatrix} \tag{1}$$

Let

$$\mathbf{C} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \tag{2}$$

Given that **C** is the midpoint of **P** and **Q**. So,

$$\mathbf{C} = \frac{\mathbf{P} + \mathbf{Q}}{2} \tag{3}$$

Now,

$$\begin{pmatrix} 2 \\ 5 \end{pmatrix} = \frac{\begin{pmatrix} 0 \\ a \end{pmatrix} + \begin{pmatrix} b \\ 0 \end{pmatrix}}{2} \tag{4}$$

$$\begin{pmatrix} 2 \\ 5 \end{pmatrix} = \begin{pmatrix} \frac{b}{2} \\ \frac{a}{2} \end{pmatrix} \tag{5}$$

$$a = 10 \quad and \quad b = 4 \tag{6}$$

Subtituting the value of a and b in Eq.1, we get:

$$\mathbf{P} = \begin{pmatrix} 0 \\ 10 \end{pmatrix} \quad and \quad \mathbf{Q} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \tag{7}$$

From the figure it is clearly verified that the theoretical solution matches with the computational solution.

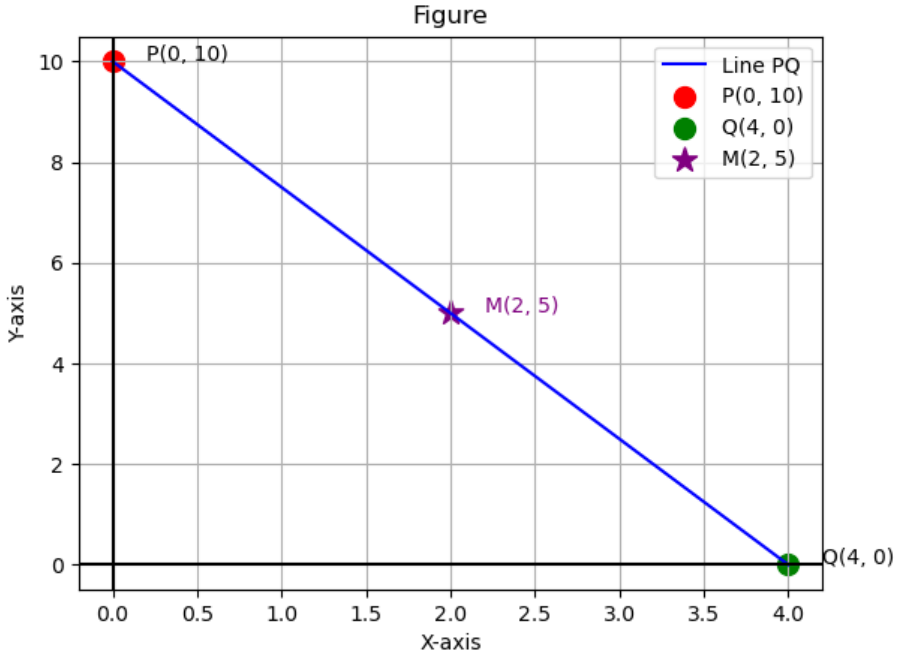
Figure
P(0, 10)
M(2, 5)
Q(4, 0)
Line PQ
P(0, 10)
Q(4, 0)
M(2, 5)
Y-axis
X-axis
10
8
6
4
2
0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0