1.8.18

EE25BTECH11001 - Aarush Dilawri

Question:
Find the values of y for which the distance between the points $\mathbf{P}(2,-3)$ and $\mathbf{Q}(10,y)$is 10 units.
Solution:

We are given the points

$$\mathbf{P} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}, \quad \mathbf{Q} = \begin{pmatrix} 10 \\ y \end{pmatrix} \tag{1}$$

The distance between them is 10 units, so

$$\|\mathbf{P} - \mathbf{Q}\| = 10 \tag{2}$$

Squaring both sides,

$$\|\mathbf{P} - \mathbf{Q}\|^2 = \|\mathbf{P}\|^2 + \|\mathbf{Q}\|^2 + 2\mathbf{P}^T\mathbf{Q} = 10^2 \tag{3}$$

Substituting,

$$13 + (10 + y)^2 + 2(20 - 3y) = 100 \tag{4}$$

$$\implies y = 3 \quad \text{or} \quad y = -9 \tag{5}$$

See Fig. 0 ,

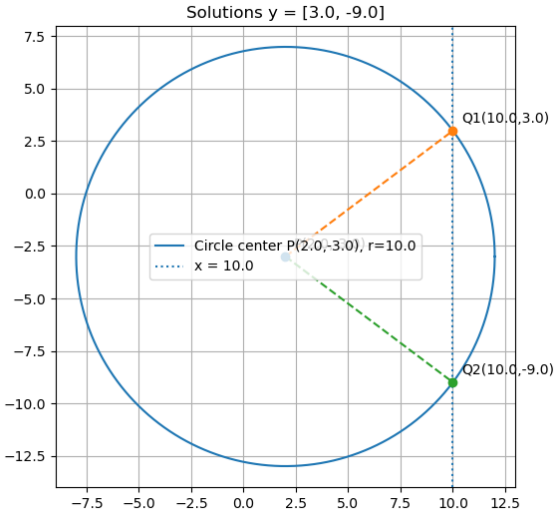

Fig. 0