AI24BTECH11028- Ronit Ranjan

Question:

If a point A (0, 2) is equidistant from the points B(3, p) and C (p, 5), then find the value of p.

Solution: We have AB = AC, which implies,

$$||A - B|| = ||A - C|| \tag{0.1}$$

$$\sqrt{(A-B)^T(A-B)} = \sqrt{(A-C)^T(A-C)}$$
 (0.2)

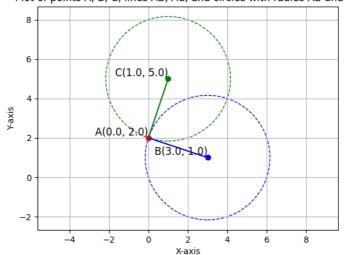
where $A = \begin{pmatrix} 0 \\ 2 \end{pmatrix} B = \begin{pmatrix} 3 \\ p \end{pmatrix} C = \begin{pmatrix} p \\ 5 \end{pmatrix}$.

$$\begin{pmatrix} -3 & 2-p \end{pmatrix} \begin{pmatrix} -3 \\ 2-p \end{pmatrix} = \begin{pmatrix} -p & -3 \end{pmatrix} \begin{pmatrix} -p \\ -3 \end{pmatrix} \tag{0.3}$$

$$9 + (2 - p)^2 = p^2 + 9 ag{0.4}$$

$$p = 1 \tag{0.5}$$

Plot of points A, B, C, lines AB, AC, and circles with radius AB and AC



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