ASSIGNMENT 7

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Download all python codes from

https://github.com/Y.Nagarani/ASSIGNMEN7/tree/main/CODES

and latex-tikz codes from

https://github.com/Y.Nagarani/ASSIGNMENT7/tree/main

1 Question No 2.25(vector forms)

Find the equation of set of points P such that

$$(PA)^2 + (PB)^2 = 2k^2; \tag{1.0.1}$$

$$\mathbf{A} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}; \tag{1.0.2}$$

$$\mathbf{B} = \begin{pmatrix} -1 \\ 3 \\ -7 \end{pmatrix}; \tag{1.0.3}$$

respectively.

2 SOLUTION

Given ,

$$\mathbf{A} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}; \tag{2.0.1}$$

$$\mathbf{B} = \begin{pmatrix} -1 \\ 3 \\ -7 \end{pmatrix}; \tag{2.0.2}$$

Let

$$\mathbf{P} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}; \tag{2.0.3}$$

The given equation is

$$(PA)^2 + (PB)^2 = 2k^2 \tag{2.0.4}$$

so,

$$\implies (x-3)^2 + (y-4)^2 + (z-5)^2 + (x+1)^2 + (y-3)^2 + (z+7 \tag{2.0.5}$$

$$\implies 2x^2 + 2y^2 + 2z^2 - 4x - 14y + 4z + 109 - 2k^2 = \tag{2.0.6}$$

$\therefore$ the required equation is

$$2x^2 + 2y^2 + 2z^2 - 4x - 14y + 4z + 109 - 2k^2 = 0 \tag{2.0.7}$$