

ASSIGNMENT 7

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Download all python codes from

<https://github.com/Atlakeerthana/Assignment7/tree/main/Assignment7>

and latex-tikz codes from

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so,

$$(\mathbf{PA})^2 = \left\| \begin{pmatrix} \mathbf{X} \\ \mathbf{Y} \\ \mathbf{Z} \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \right\|^2 \quad (2.0.4)$$

$$= \left\| \begin{pmatrix} \mathbf{X} \\ \mathbf{Y} \\ \mathbf{Z} \end{pmatrix} \right\|^2 + \left\| \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \right\|^2 - 2 \begin{pmatrix} 3 & 4 & 5 \end{pmatrix} \begin{pmatrix} \mathbf{X} & \mathbf{Y} & \mathbf{Z} \end{pmatrix} \quad (2.0.5)$$

$$= \mathbf{X}^2 + \mathbf{Y}^2 + \mathbf{Z}^2 - 6\mathbf{X} - 8\mathbf{Y} - 10\mathbf{Z} + 50 \quad (2.0.6)$$

and

$$(\mathbf{PB})^2 = \left\| \begin{pmatrix} \mathbf{X} \\ \mathbf{Y} \\ \mathbf{Z} \end{pmatrix} - \begin{pmatrix} -1 \\ 3 \\ -7 \end{pmatrix} \right\|^2 \quad (2.0.7)$$

$$= \left\| \begin{pmatrix} \mathbf{X} \\ \mathbf{Y} \\ \mathbf{Z} \end{pmatrix} \right\|^2 + \left\| \begin{pmatrix} -1 \\ 3 \\ -7 \end{pmatrix} \right\|^2 - 2 \begin{pmatrix} -1 & 3 & -7 \end{pmatrix} \begin{pmatrix} \mathbf{X} & \mathbf{Y} & \mathbf{Z} \end{pmatrix} \quad (2.0.8)$$

$$= \mathbf{X}^2 + \mathbf{Y}^2 + \mathbf{Z}^2 + 2\mathbf{X} - 6\mathbf{Y} + 14\mathbf{Z} + 59 \quad (2.0.9)$$

1 QUESTION No 2.25(VECTOR FORMS)

Find the equation of set of points P such that

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

$$\mathbf{A} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}; \quad (1.0.2)$$

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

respectively.

The given equation is

$$(\mathbf{PA})^2 + (\mathbf{PB})^2 = 2k^2 \quad (2.0.10)$$

Sub (2.0.7) and (2.0.10) values in (2.0.11)

∴ the required equation is

$$2\mathbf{X}^2 + 2\mathbf{Y}^2 + 2\mathbf{Z}^2 - 4\mathbf{X} - 14\mathbf{Y} + 4\mathbf{Z} + 109 = 2k^2 \quad (2.0.11)$$

2 SOLUTION

Given ,

$$\mathbf{A} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}; \quad (2.0.1)$$

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

Let

$$\mathbf{P} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}; \quad (2.0.3)$$