1-1.8-3

EE24BTECH11005 - Arjun Pavanje

Question:

Find the lengths of the medians of the triangle with vertices $\mathbf{A}\begin{pmatrix}0\\0\\6\end{pmatrix}, \mathbf{B}\begin{pmatrix}0\\4\\0\end{pmatrix}, \mathbf{C}\begin{pmatrix}6\\0\\0\end{pmatrix}$

Solution:

Variable	Description
A	$\begin{pmatrix}0\\0\\6\end{pmatrix}$ point
B	$\begin{pmatrix}0\\4\\0\end{pmatrix}$ point
C	$\begin{pmatrix}6\\0\\0\end{pmatrix}$ point
D	Midpoint of BC
E	Midpoint of CA
F	Midpoint of AB

TABLE I: Variables Used

1)

$$D = \frac{B+C}{2} = \begin{pmatrix}3\\2\\0\end{pmatrix} \tag{1}$$

$$\left\|\frac{B+C}{2} - A\right\| = \sqrt{\left(\frac{B+C}{2} - A\right)^T \left(\frac{B+C}{2} - A\right)} = \sqrt{49} \tag{2}$$

Length of median $AD = 7$ units

2)

$$E = \frac{C+A}{2} = \begin{pmatrix}3\\0\\3\end{pmatrix} \tag{3}$$

$$\left\|\frac{C+A}{2} - B\right\| = \sqrt{\left(\frac{C+A}{2} - B\right)^T \left(\frac{C+A}{2} - B\right)} = \sqrt{34} \tag{4}$$

Length of median $BE = \sqrt{34}$ units

3)

$$F = \frac{A+B}{2} = \begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix} \tag{5}$$

$$\left\| \frac{A+B}{2} - C \right\| = \sqrt{\left(\frac{A+B}{2} - C \right)^T \left(\frac{A+B}{2} - C \right)} = \sqrt{49} \tag{6}$$

Length of median $CF = 7$ units

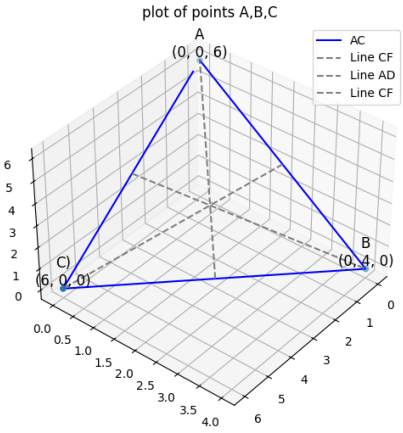

Fig. 1: Plot of Triangle ABC, medians