1.1.8.17

EE24BTECH11024 - G.Abhimanyu Koushik

Question:

The perimeter of triangle with vertices $\begin{pmatrix}0\\4\end{pmatrix}$,$\begin{pmatrix}0\\0\end{pmatrix}$ and $\begin{pmatrix}3\\0\end{pmatrix}$ is

Solution:

Symbol	Value	Description
A	$\begin{pmatrix}0\\4\end{pmatrix}$	First vertex
B	$\begin{pmatrix}3\\0\end{pmatrix}$	Second vertex
O	$\begin{pmatrix}0\\0\end{pmatrix}$	Third vertex

TABLE 0: Variables Used

Distance between **A** and **B**, d_1 is

$$(\mathbf{A}-\mathbf{B}) = \begin{pmatrix}0\\4\end{pmatrix} - \begin{pmatrix}3\\0\end{pmatrix} = \begin{pmatrix}-3\\4\end{pmatrix} \tag{0.1}$$

$$(\mathbf{A}-\mathbf{B})^{\top}(\mathbf{A}-\mathbf{B}) = 25 \tag{0.2}$$

$$d_1 = \|\mathbf{A}-\mathbf{B}\| = 5 \tag{0.3}$$

Distance between **A** and **O**, d_2 is

$$(\mathbf{A}-\mathbf{O}) = \begin{pmatrix}0\\4\end{pmatrix} - \begin{pmatrix}0\\0\end{pmatrix} = \begin{pmatrix}0\\4\end{pmatrix} \tag{0.4}$$

$$(\mathbf{A}-\mathbf{O})^{\top}(\mathbf{A}-\mathbf{O}) = 16 \tag{0.5}$$

$$d_2 = \|\mathbf{A}-\mathbf{O}\| = 4 \tag{0.6}$$

Distance between **O** and **B**, d_3 is

$$(\mathbf{O}-\mathbf{B}) = \begin{pmatrix}0\\0\end{pmatrix} - \begin{pmatrix}3\\0\end{pmatrix} = \begin{pmatrix}-3\\0\end{pmatrix} \tag{0.7}$$

$$(\mathbf{O}-\mathbf{B})^{\top}(\mathbf{O}-\mathbf{B}) = 9 \tag{0.8}$$

$$d_3 = \|\mathbf{O}-\mathbf{B}\| = 3 \tag{0.9}$$

Perimeter of the triangle is

$$d_1 + d_2 + d_3 = 12 \tag{0.10}$$

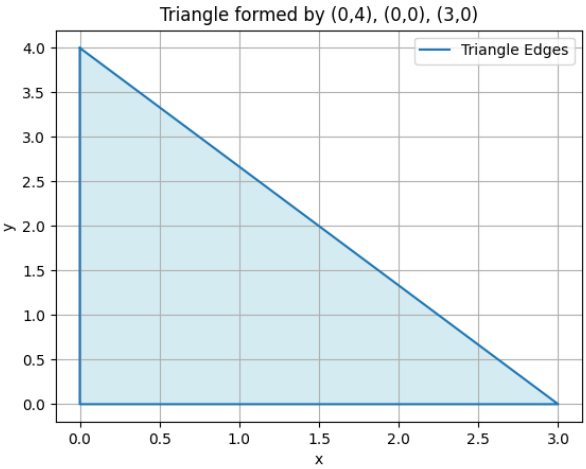

Fig. 0.1: Plot of the triangle