

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

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

$$(\mathbf{A} - \mathbf{B})^T (\mathbf{A} - \mathbf{B}) = 25 \quad (0.2)$$

$$d_1 = \|\mathbf{A} - \mathbf{B}\| = 5 \quad (0.3)$$

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

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

$$(\mathbf{A} - \mathbf{O})^T (\mathbf{A} - \mathbf{O}) = 16 \quad (0.5)$$

$$d_2 = \|\mathbf{A} - \mathbf{O}\| = 4 \quad (0.6)$$

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

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

$$(\mathbf{O} - \mathbf{B})^T (\mathbf{O} - \mathbf{B}) = 9 \quad (0.8)$$

$$d_3 = \|\mathbf{O} - \mathbf{B}\| = 3 \quad (0.9)$$

Perimeter of the triangle is

$$d_1 + d_2 + d_3 = 12 \quad (0.10)$$

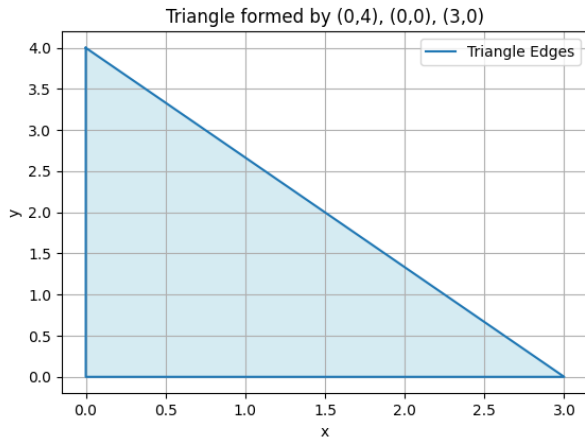


Fig. 0.1: Plot of the triangle