Assignment 6

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Find Python Codes from below link

https://github.com/AnilMondedla/Python/Assignment_6

and latex-tikz codes from

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1 Examples 1

1.1 Question 13

Prove that the points (2,-2),(8,4),(5,7), and (-1,1) are at the angular points of a rectangle.

1.2 Solution

$$\mathbf{A} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 8 \\ 4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \tag{1.2.1}$$

Direction vector of A and B

$$m1 = \begin{pmatrix} 2 \\ -2 \end{pmatrix} - \begin{pmatrix} 8 \\ 4 \end{pmatrix} = \begin{pmatrix} -6 \\ -6 \end{pmatrix} \tag{1.2.2}$$

Direction vector of B and C

$$m2 = \begin{pmatrix} 8 \\ 4 \end{pmatrix} - \begin{pmatrix} 5 \\ 7 \end{pmatrix} = \begin{pmatrix} 3 \\ -3 \end{pmatrix} \tag{1.2.3}$$

Direction vector of C and D

$$m3 = \begin{pmatrix} 5 \\ 7 \end{pmatrix} - \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 6 \\ 6 \end{pmatrix} \tag{1.2.4}$$

Direction vector of D and A

$$m4 = \begin{pmatrix} -1 \\ 1 \end{pmatrix} - \begin{pmatrix} 2 \\ -2 \end{pmatrix} = \begin{pmatrix} -3 \\ 3 \end{pmatrix} \tag{1.2.5}$$

Here,

These direction vectors are parallel

$$m1 = k.m3 \tag{1.2.6}$$

These direction vectors are parallel

$$m2 = k.m4 \tag{1.2.7}$$

For a rectangle

$$(m1)^{\intercal}(m2) = 0 \tag{1.2.8}$$

$$\begin{pmatrix} -6 \\ -6 \end{pmatrix}^{\intercal} \begin{pmatrix} 3 \\ -3 \end{pmatrix} = 0 \tag{1.2.9}$$

$$\begin{pmatrix} -6 & -6 \end{pmatrix} \begin{pmatrix} 3 \\ -3 \end{pmatrix} = 0 \tag{1.2.10}$$

$$-18 + 18 = 0$$

$$0 = 0$$

Hence, given points A,B,C and D are the Vector points of a rectangle.

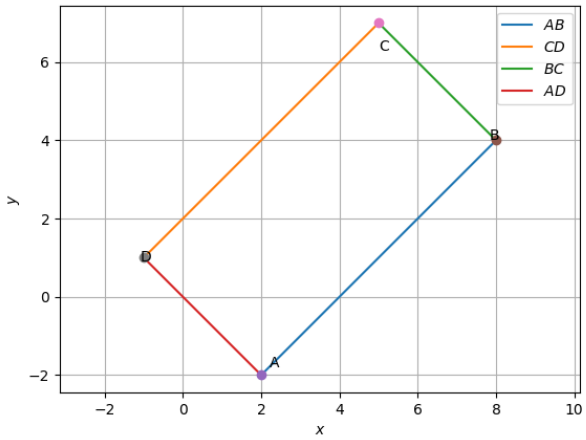

Fig. 0