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Matrix Assignment - Lines

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I. Problem

One side of a rectangle lies along the line 4x+7y+5=0. Two of its vertices are (-3,1) and (1,1).Find the equation of the other sides.

II. Solution

The direction of given line

$$4\mathbf{x} + 7\mathbf{y} + 5 = 0 \tag{1}$$

$$7\mathbf{y} = -4\mathbf{x} - 5 \tag{2}$$

$$\mathbf{y} = \frac{-4}{7}\mathbf{x} - \frac{5}{7} \tag{3}$$

$$\mathbf{L} = m = \begin{pmatrix} 1 \\ \frac{-4}{7} \end{pmatrix} \tag{4}$$

The direction vector of line AC

$$d_{AC} = A - C = \begin{pmatrix} -4 \\ 0 \end{pmatrix} \tag{5}$$

AC is diagonal of the given rectangle between AC and AB

where

$$\mathbf{Cos}\theta = \frac{m^T d_{AC}}{\|m\|\|m_{AC}\|} \tag{6}$$

Vertices for A and B

$$B - A = R_\theta \big(C - A\big) \frac{\big(A - C\big)\, cos\theta}{\|A - C\|} \tag{7}$$

$$D - A = R_{\frac{\pi}{2}-0} \big(C - A\big)\, sin\theta \tag{8}$$

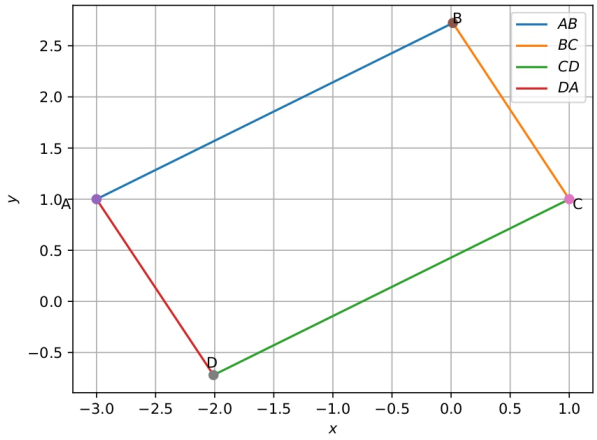
where

$$R = \begin{pmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{pmatrix} \tag{9}$$

Using python we get the point of B and D

https://github.com/sssurajit/fwc/blob/main/line/codes/sline.py

III. Figure



IV. Code Link

https://github.com/sssurajit/fwc/blob/main/line/codes/line.py

Execute the code by using the command
python3 line.py