

SM5083

Assignment No. 02

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SM21MTECH11002

1. CHAPTER III EXAMPLES-4 Q. III

1.1. Problem Statement: Find the diagonals of the parallelogram formed by the lines $x-6y=5$, $x-6y=11$, $3x+2y=12$, $3x+2y=6$

Solution: To find the diagonals of the parallelogram first we have to find position vectors. It can be found by knowing the co-ordinates of parallelogram. So,

$$\mathbf{A} = \begin{pmatrix} 2.3 \\ -0.45 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4.1 \\ -0.15 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4.7 \\ -1.05 \end{pmatrix}$$

$$\mathbf{D} = \begin{pmatrix} 2.9 \\ -1.35 \end{pmatrix}$$

$$\mathbf{D1} = \mathbf{D} - \mathbf{B} = \begin{pmatrix} -1.2 \\ -1.2 \end{pmatrix}$$

$$\mathbf{D2} = \mathbf{C} - \mathbf{A} = \begin{pmatrix} 2.4 \\ -0.6 \end{pmatrix}$$

A) Now to find diagonal D1,
It can be found as,

$$\|\mathbf{D1}\|^2 = (\mathbf{D1})^\top (\mathbf{D1}) = \begin{pmatrix} -1.2 & -1.2 \end{pmatrix} \begin{pmatrix} -1.2 \\ -1.2 \end{pmatrix} \quad (1.1.1)$$

$$\|\mathbf{D1}\| = \sqrt{((-1.2)^2 + (-1.2)^2)} \quad (1.1.2)$$

$$\|\mathbf{D1}\| = 1.697 \quad (1.1.3)$$

Similarly,

B) Now to find diagonal D2,
It can be found as,

$$\|\mathbf{D2}\|^2 = (\mathbf{D2})^\top (\mathbf{D2}) = \begin{pmatrix} 2.4 & -0.6 \end{pmatrix} \begin{pmatrix} 2.4 \\ -0.6 \end{pmatrix} \quad (1.1.4)$$

$$\|\mathbf{D2}\| = \sqrt{((2.4)^2 + (-0.6)^2)} \quad (1.1.5)$$

$$\|\mathbf{D2}\| = 2.47 \quad (1.1.6)$$

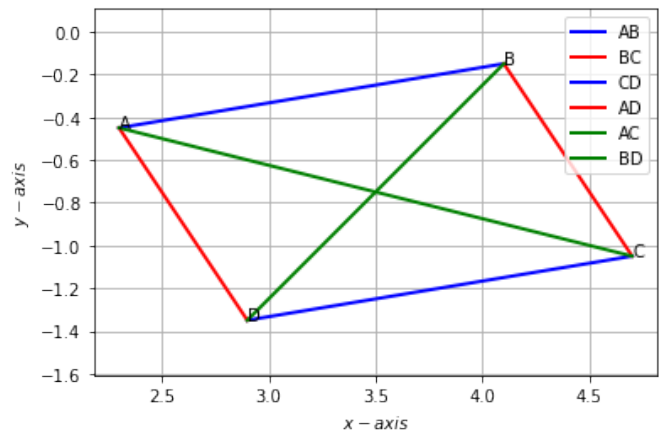


Fig. 1.1. Parallelogram