

ASSIGNMENT 9

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Download all python codes from

<https://github.com/Gayathri1729/SRFP/tree/main/Assignment8>

and latex-tikz codes from

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Thus

$$x = 4$$

(8)

1 VECTOR 2.36

The line through the points $\begin{pmatrix} -2 \\ 6 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ 8 \end{pmatrix}$ is perpendicular to the line through the points $\begin{pmatrix} 8 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} x \\ 24 \end{pmatrix}$. Find the value of x .

2 SOLUTION

Let the line joining $\begin{pmatrix} -2 \\ 6 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ 8 \end{pmatrix}$ be L_1 and the line joining $\begin{pmatrix} 8 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} x \\ 24 \end{pmatrix}$ be L_2 .

The vector parallel to L_1 ,

$$\mathbf{n}_1 = \begin{pmatrix} 4 \\ 8 \end{pmatrix} - \begin{pmatrix} -2 \\ 6 \end{pmatrix} \quad (1)$$

$$= \begin{pmatrix} 6 \\ 2 \end{pmatrix} \quad (2)$$

The vector parallel to L_2 ,

$$\mathbf{n}_2 = \begin{pmatrix} x \\ 24 \end{pmatrix} - \begin{pmatrix} 8 \\ 12 \end{pmatrix} \quad (3)$$

$$= \begin{pmatrix} x-8 \\ 12 \end{pmatrix} \quad (4)$$

Since L_1 and L_2 are perpendicular the angle between \mathbf{n}_1 and \mathbf{n}_2 is 90°

$$\cos 90 = \frac{\mathbf{n}_1^\top \mathbf{n}_2}{\|\mathbf{n}_1\| \|\mathbf{n}_2\|} \quad (5)$$

$$0 = \mathbf{n}_1^\top \mathbf{n}_2 \quad (6)$$

$$\begin{pmatrix} 6 & 2 \end{pmatrix} \begin{pmatrix} x-8 \\ 12 \end{pmatrix} = 0 \quad (7)$$

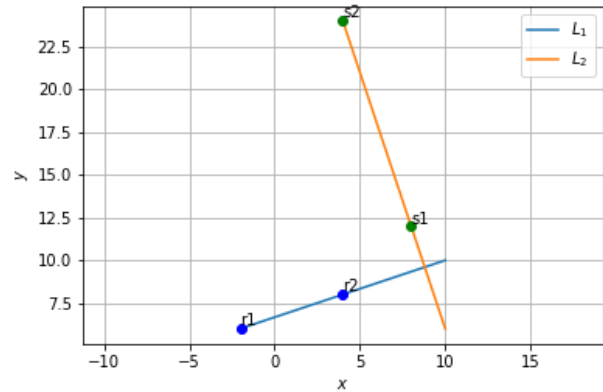


Fig. 2.1. Lines L_1 and L_2