# ASSIGNMENT-1

C.RAMYA TULASI

Download all python codes from

https://github.com/CRAMYATULASI/ASSIGNMENT-1/tree/main/ASSIGNMENT%201/CODES

and latex-tikz codes from

https://github.com/CRAMYATULASI/ASSIGNMENT-1/tree/main/ASSIGNMENT%201

## 1 QUESTION NO-2.23

Construct $\triangle LMN$ right angled at $M$ such that $LN = 5$ and $MN = 3$.

## 2 SOLUTION

Let

$$\mathbf{L} = \begin{pmatrix} 0 \\ l \end{pmatrix}, \mathbf{M} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{N} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \tag{2.0.1}$$

Now,

$$\|\mathbf{N} - \mathbf{M}\|^2 = \|\mathbf{N}\|^2 = 3^2 = 9 \tag{2.0.2}$$

$$\|\mathbf{L} - \mathbf{M}\|^2 = \|\mathbf{L}\|^2 = l^2 \tag{2.0.3}$$

We know,

$$\|\mathbf{L} - \mathbf{N}\|^2 = (\mathbf{L} - \mathbf{N})^T(\mathbf{L} - \mathbf{N}) \tag{2.0.4}$$

$$= \mathbf{L}^T\mathbf{L} + \mathbf{N}^T\mathbf{N} - \mathbf{L}^T\mathbf{N} - \mathbf{L}^T\mathbf{L} \tag{2.0.5}$$

$$= \|\mathbf{L}\|^2 + \|\mathbf{L}\|^2 - 2\mathbf{L}^T\mathbf{N} \tag{2.0.6}$$

$$= \|\mathbf{L}\|^2 + \|\mathbf{N}\|^2 - 2.0 \tag{2.0.7}$$

$$= l^2 + 3^2 \tag{2.0.8}$$

$$= l^2 + 9 \tag{2.0.9}$$

But we know LN=5

$$\|\mathbf{L} - \mathbf{N}\|^2 = 5^2 = 25 \tag{2.0.10}$$

$$l^2 + 9 = 25 \tag{2.0.11}$$

$$l^2 = 25 - 9 \tag{2.0.12}$$

$$l^2 = 16 \tag{2.0.13}$$

$$l = \pm 4 \tag{2.0.14}$$

As we consider $\triangle LMN$ in first quadrant we consider $l$=4

$$\therefore l = 4 \tag{2.0.15}$$

Now, Vertices of given $\triangle LMN$ can be written as,

$$\mathbf{L} = \begin{pmatrix} 0 \\ l \end{pmatrix} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}, \mathbf{M} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{N} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \tag{2.0.16}$$

Now, $\triangle LMN$ can be plotted using vertices $LM$ ,$MN$ and $LN$ .

Plot of the Right angle $\triangle PQR$:

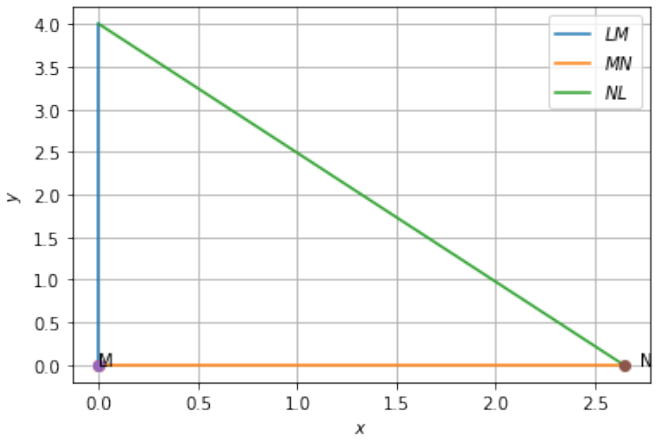


Fig. 2.1: Right Angle $\triangle LMN$