Assignment 1

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Download all python codes from

https://github.com/teja3657/Assignment1/tree/master/CODES

and latex-tikz codes from

https://github.com/teja3657/Assignment1/blob/master/Assignment1.tex

1 Question No.2.16

Construct an isosceles triangle in which the lengths of the equal sides is 6.5 and the angle between them is 110°.

2 SOLUTION

The vertices are:

$$\mathbf{L} = \begin{pmatrix}0\\0\end{pmatrix}, \mathbf{D} = \begin{pmatrix}ld\\0\end{pmatrix}, \mathbf{O} = \begin{pmatrix}p1\\q1\end{pmatrix} \tag{2.0.1}$$

Now, Lines od , ol and ld Can be plotted.

$$\mathbf{OD} = 2a\cos(35) \tag{2.0.2}$$

$$(here, a = ol = 6.5) \tag{2.0.3}$$

$$\mathbf{OD} = (13)\cos(35) = 10.6 \tag{2.0.4}$$

Coordinates of O(p1,q1)

$$\mathbf{p1} = \frac{ld^2 + ol^2 - od^2}{2(ld)} \tag{2.0.5}$$

$$\mathbf{p1} = \frac{(6.5)^2 + (6.5)^2 - (10.6)^2}{2(6.5)} \tag{2.0.6}$$

$$\mathbf{p1} = \frac{42.25 + 42.25 - 112.36}{13} \tag{2.0.7}$$

$$\implies p1 = -2.14 \tag{2.0.8}$$

$$\mathbf{q1} = \sqrt{(ol)^2 - (p1)^2} \tag{2.0.9}$$

$$\mathbf{q1} = \sqrt{(6.5)^2 - (-2.14)^2} \tag{2.0.10}$$

$$\implies q1 = 6.13 \tag{2.0.11}$$

The vertex O can be expressed in polar coordinate form as

$$\mathbf{O} = l\begin{pmatrix}\cos\theta\\\sin\theta\end{pmatrix} \tag{2.0.12}$$

O can be expressed as

$$\mathbf{O} = l\begin{pmatrix}cosO\\sinO\end{pmatrix} \tag{2.0.13}$$

$$\mathbf{O} = \begin{pmatrix}5.324\\3.728\end{pmatrix} \tag{2.0.14}$$

So, the vertices of $\triangle OLD$ are

$$\mathbf{L} = \begin{pmatrix}0\\0\end{pmatrix}, \mathbf{D} = \begin{pmatrix}6.5\\0\end{pmatrix}, \mathbf{O} = \begin{pmatrix}5.324\\3.728\end{pmatrix} \tag{2.0.15}$$

Now, Isosceles $\triangle OLD$ can be plotted using vertices LD ,OL and DO.
Plot of the Isosceles $\triangle OLD$ is required.

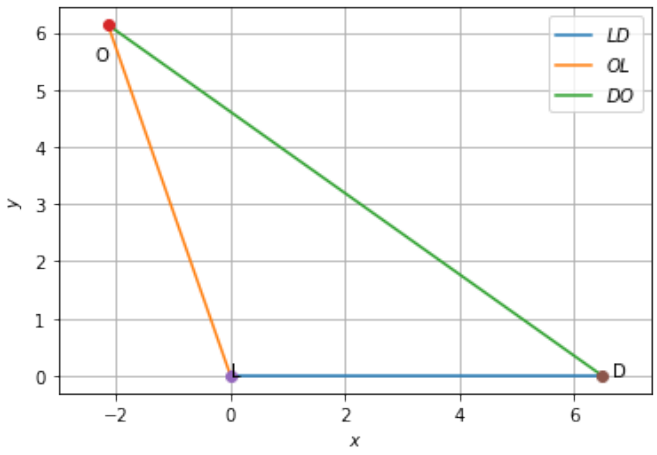

Fig. 2.1: Isosceles triangle $\triangle OLD$