ASSIGNMENT-2

Ojaswa Pandey

Download all python codes from

https://github.com/behappy0604/Assignment2

and latex-tikz codes from

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1 Question No. 2.39

Construct a quadrilateral MORE where $MO = 6, OR = 4.5, \angle M = 60°, \angle O = 105°$ and $\angle R = 105°$.

2 SOLUTION

For this quadrilateral MORE we have,

$$\angle M + \angle O + \angle R = 60° + 105° + 105° = 270°, \tag{2.0.1}$$

1) Now on calculating, we get

$$\implies \angle E + 270° = 360°, \tag{2.0.2}$$

$$\implies \angle E = 90° \tag{2.0.3}$$

2) Now taking sum of all the angles given and (2.0.3) we get

$$\angle M + \angle O + \angle R + \angle E = 360° \tag{2.0.4}$$

So construction of given quadrilateral is possible as sum of all the angles is equal to 360°.

3) Now,Using cosine formula in $\triangle MOR$ we can find RM:

$$\implies \|\mathbf{R}-\mathbf{M}\|^2 = \|\mathbf{M}-\mathbf{O}\|^2+\|\mathbf{O}-\mathbf{R}\|^2-2\times\|\mathbf{M}-\mathbf{O}\|\times\|\mathbf{O}-\mathbf{R}\|\cos O \tag{2.0.5}$$

$$\implies RM = 8.38 \tag{2.0.6}$$

4) Also in $\triangle MOR$, Let $\angle OMR = \theta$, $\angle MOR = \beta$, $\angle ORM = \gamma$.Now using sine formula in $\triangle MOR$ we have

$$\frac{\sin\theta}{OR} = \frac{\sin\beta}{RM} = \frac{\sin\gamma}{MO} \tag{2.0.7}$$

$$\theta = \sin^{-1}(0.5186); \tag{2.0.8}$$

$$\theta = \angle OMR = 31.24°; \tag{2.0.9}$$

5) Now polar coordinates of vertex R of $\triangle MOR$ be $(RM\cos\theta, RM\sin\theta)$, we get

$$R(8.38\times\cos 31.24, 8.38\times\sin 31.24) \tag{2.0.10}$$

$$\implies \mathbf{R} = \begin{pmatrix}7.16\\4.35\end{pmatrix} \tag{2.0.11}$$

6) Now in $\triangle MER$,we get

$$\angle EMR = 28.76° \tag{2.0.12}$$

7) Considering the polar coordinates of E of $\triangle MER$ and solving we get,

$$\implies \mathbf{E} = \begin{pmatrix}3.67\\6.36\end{pmatrix} \tag{2.0.13}$$

8) Now, we have the coordinate of vertices M,O,R,E as M= $\begin{pmatrix}0\\0\end{pmatrix}$, O= $\begin{pmatrix}6\\0\end{pmatrix}$, R= $\begin{pmatrix}7.16\\4.35\end{pmatrix}$, E= $\begin{pmatrix}3.67\\6.36\end{pmatrix}$.

9) On constructing the given quadilateral on python we get:

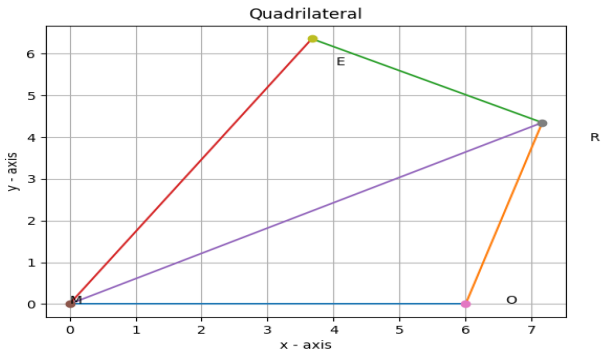

Fig. 2.1: Quadrilateral MORE