ASSIGNMENT-2

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Download all python codes from

https://github.com/behappy0604/Assignment2

and latex-tikz codes from

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1 Question No. 2.36

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

2 Solution

For this quadrilateral MORE we have,

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

1) Now on calculating, we get

$$\implies \angle E + 270^\circ = 360^\circ, \tag{2.0.2}$$
$$\implies \angle E = 90^\circ \tag{2.0.3}$$

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

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

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

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

$$\theta = \sin^{-1}(0.5186); \tag{2.0.8}$$
$$\theta = \angle OMR = 31.24^\circ; \tag{2.0.9}$$

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

$$R(8.38 \times \cos 31.24, 8.38 \times \sin 31.24) \tag{2.0.10}$$
$$\implies R(7.16, 4.35) \tag{2.0.11}$$

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

$$\angle EMR = 28.76^\circ \tag{2.0.12}$$

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

$$E(3.67, 6.36) \tag{2.0.13}$$

8) Now, we have the coordinate of vertices M,O,R,E as M(0,0); O(6,0); R(7.16, 4.35) ;E(3.67, 6.36).
9) On constructing the given quadilateral on python we get:

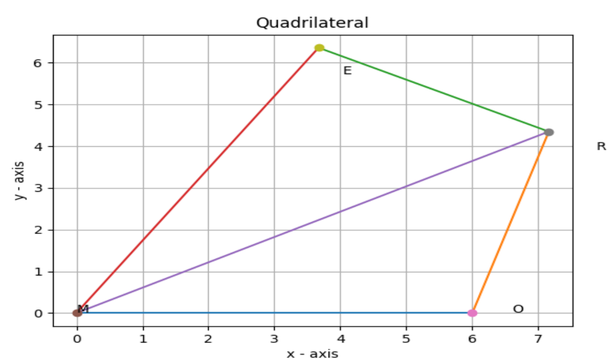

Fig. 2.1: Quadrilateral MORE