ASSIGNMENT-2

UNNATI GUPTA

Download all python codes from

https://github.com/unnatigupta2320/Assignment−2/tree/master/codes

and latex-tikz codes from

https://github.com/unnatigupta2320/Assignment−2/tree/master

1 Question No. 2.36

Construct a quadrilateral MIST where $MI = 3.5, IS = 6.5, \angle M = 75°, \angle I = 105°$ and $\angle S = 120°$.

2 SOLUTION

For this quadrilateral MIST we have,

$$\angle M + \angle I = 75° + 105° = 180°, \tag{2.0.1}$$

$\implies MT \parallel IS (\because$ MI being the transversal)
As, sum of adjacent angle on same side is 180° only when lines are parallel.

1) Now, considering ST as another transversal on parallel lines MT and IS then$\angle S$ and $\angle T$being on same side of transversal, we get

$$\implies \angle S + \angle T = 180°, \tag{2.0.2}$$
$$\implies \angle T = 60° \tag{2.0.3}$$

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

$$\angle M + \angle I + \angle S + \angle T = 360° \tag{2.0.4}$$

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

3) Now,Using cosine formula we can find SM:

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

$$\implies SM = 8.14 \tag{2.0.6}$$

4) Also,using sine formula in $\triangle MIS$,we have

$$\frac{\sin M}{m} = \frac{\sin I}{i} = \frac{\sin S}{s} \tag{2.0.7}$$

$$\angle M = \arcsin 0.7713; \tag{2.0.8}$$
$$\angle M = 50.47°; \tag{2.0.9}$$

5) Now,polar coordinates of vertex S of $\triangle MIS$ be $(SM \cos M, SM \sin M)$, we get

$$S(5.18, 6.27) \tag{2.0.10}$$

6) Similarly, we can get vertex T of$\triangle MTS$ as

$$T(2.42, 9.03) \tag{2.0.11}$$

7) Now, we have the coordinate of vertices M,I,S,T as M(0,0); I(3.5,0); S(5.18,6.27);T(2.42,9.03);
8) We can construct the quadrilateral.On constructing the given quadrilateral we, get:

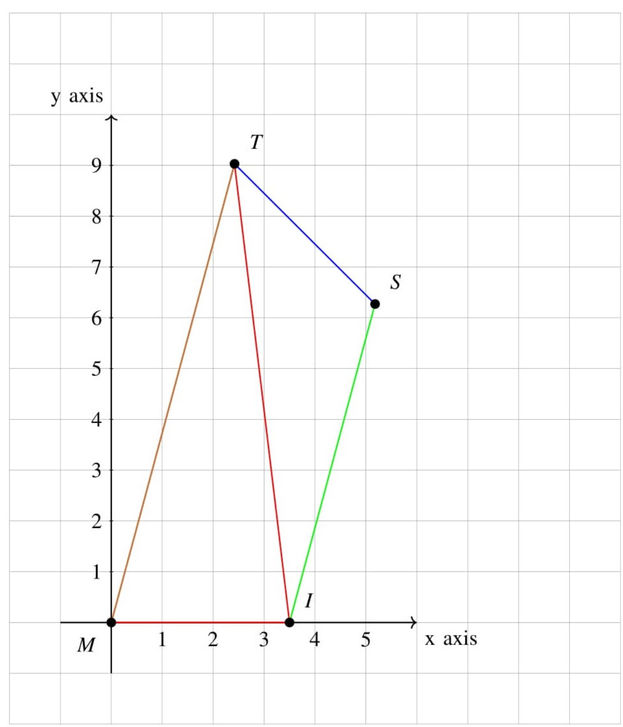

Fig. 2.1: Quadrilateral MIST