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 adjacent side lengths MI =3.5, IS=6.5 and angles, $\angle M = 75°, \angle I = 105° and \angle S = 120°$.
Also, $\angle M = 75° and \angle I = 105°$,
$where \angle M + \angle I = 75° + 105° = 180°$,
$\implies MT||IS$ (MI being the transversal)
As, sum of adjacent angle on same side is 180°only when lines are parallel.
Now, considering ST as another transversal on parallel lines MT and IS , then
$\angle S + \angle T = 180°$,(angles on same side of transversal)

$\implies 120° + \angle T = 180°;$
$\implies \angle T = 180° - 120°;$
$\implies \angle T = 60°;$
Now taking sum of all the angles given $and \angle T$, we get
$\implies \angle M + \angle I + \angle S + \angle T$
$\implies 75° + 105° + 120° + 60°,$
$\implies 360°;$
So construction of given quadrilateral is possible as sum of all the angles is equal to 360°.
Now,Using cosine formula we can find SM:
$\|\mathbf{S}-\mathbf{M}\|^2 = \|\mathbf{M}-\mathbf{I}\|^2 + \|\mathbf{I}-\mathbf{S}\|^2 - 2 \times \|\mathbf{M}-\mathbf{I}\| \times \|\mathbf{I}-\mathbf{S}\| \cos I;$
$\implies SM^2 = 3.5^2 + 6.5^2 - 2 \times 3.5 \times 6.5 \times \cos 105°;$
$\implies$ SM= $\sqrt{8.14 * 8.14}$;

$$\implies SM = 8.14 \qquad (2.0.1)$$

1) Let the coordinate of vertices M,I,S be M(0,0); I(3.5,0); S(p,q);
2) Using Distance Formula we have
   - $SM^2 = (p-0)^2 + (q-0)^2$;
   - $SM^2 = p^2 + q^2$;
   - $p^2 + q^2 = 8.14 (SM = 8.14)$;
3) $And, SI^2 = (p-3.5)^2 + (q-0)^2$;
4) $(p-3.5)^2 + q^2 = 6.5^2 (SI = 6.5)$;
5) On solving,these two equations we get(p,q) =(5.46, 6.036);
6) Similarly, we can obtain T as(2.42, 9.03)
7) Now,On constructing the given quadrilateral we, get:

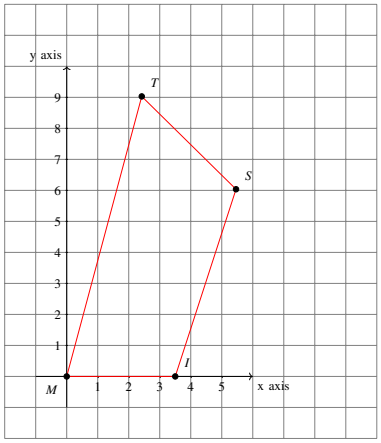

Fig. 2.1: Quadrilateral MIST