Assignment 3

Mr Shishir Badave

1 Problem 1

https://github.com/gadepall/ncert/blob/main/linalg/construction/gvv ncert constr.pdf Q.no.2.8

construct a quadrilateral MIST where $MI = 3.5, IS = 6.5, \angle M = 75°, \angle I = 105°$ and $\angle S = 120°$ Can you construct the quadrilateral MIST if $\angle M = 100°$ instead of 75°

2 Solution

The basic property of quadrilateral is that-

Lemma 2.1.
A quadrilateral should be closed shape with 4 sides

Lemma 2.2.
All the internal angles of a quadrilateral sum up to 360°

Let us consider first case, Where quadrilateral MIST has is constructed considering following parameters

$MI = 3.5cm$,

$IS = 6.5cm$, $\angle M = 75°, \angle I = 105° \angle S = 120°$

The quadrilateral was plotted with given parameters, Co-ordinates were found to be-

$$\mathbf{M} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\mathbf{I} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$$

$$\mathbf{S} = \begin{pmatrix} 7.3 \\ 6.3 \end{pmatrix}$$

$$\mathbf{T} = \begin{pmatrix} 2.5 \\ 5.4 \end{pmatrix}$$

Based on the co-ordinates, The value of angle T was calculated

$$\angle T = 55°$$

Now, The sum of all angles should be 360°if MIST is a quadrilateral, Then

$$\angle M + \angle I + \angle S + \angle T = 360°$$

75+110+120+55 = 360°

Thus, The figure plotted with given parameters fulfills the criterion, i.e the sum og angles of a quadrilateral should be 360°, Thus we can plot the quadrilateral with given parameters.

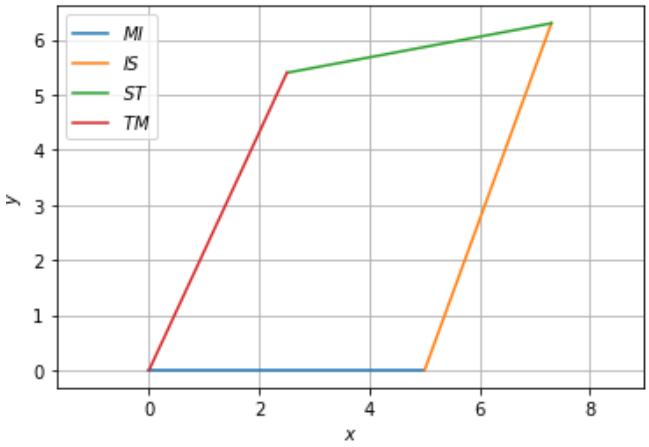

Fig. 0: Quadrilateral MIST when $\angle M = 75$

Let us consider second case, Where quadrilateral MIST attempted to be constructed considering following parameters MI = 3.5,

IS = 6.5,

$$\angle M = 100,$$

$$\angle I = 105,$$

Co-ordinates of line plot were found to be-

$$\mathbf{M} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\mathbf{I} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$$

$$\mathbf{S} = \begin{pmatrix} 7.3 \\ 6.3 \end{pmatrix}$$

$$\mathbf{T} = \begin{pmatrix} -0.9 \\ 4.7 \end{pmatrix}$$

Based on the co-ordinates, The value of angle T was calculated

$$\angle T = 80$$

Now, The sum of all angles should be 360°if MIST is a quadrilateral, Then

$$\angle M + \angle I + \angle S + \angle T = 360°$$

$$100 + 110 + 120 + 80 \neq 360°$$

”This doesn’t fulfill the criterion that the sum of all internal angle should be 360°

Thus we cannot construct the quadrilateral if

$$\angle M = 100$$

instead of 75°”

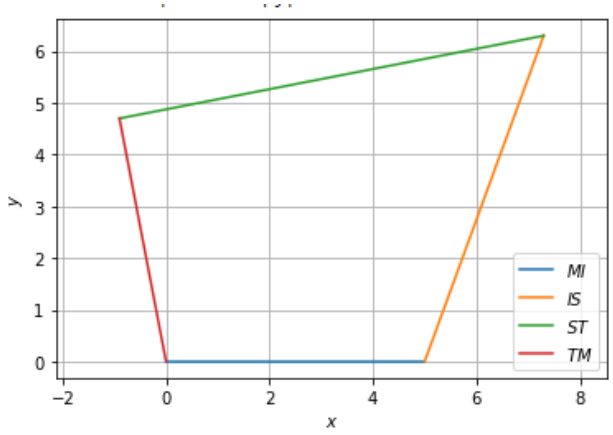

Fig. 0: Plotted figure when $\angle M = 100$