LINEAR SYSTEMS AND SIGNAL PROCESSING ASSIGNMENT 3

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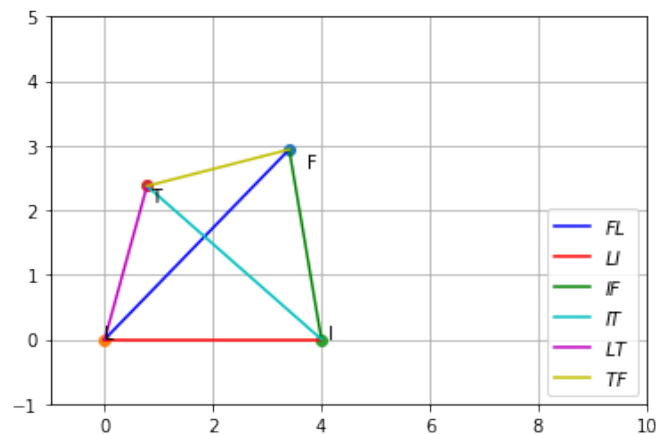
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Plotting the quadrilateral

QUESTION

Construction 2.5
Construct $LIFT$ such that $LI = 4$, $IF = 3$, $TL = 2.5$, $LF = 4.5$, $IT = 4$.

SOLUTION

In $\triangle LIF$

$$\|\mathbf{L} - \mathbf{I}\| + \|\mathbf{F} - \mathbf{L}\| = 8.5 > \|\mathbf{F} - \mathbf{I}\| \qquad (0.0.1)$$

$$\|\mathbf{F} - \mathbf{L}\| + \|\mathbf{F} - \mathbf{I}\| = 7.5 > \|\mathbf{L} - \mathbf{I}\| \qquad (0.0.2)$$

$$\|\mathbf{L} - \mathbf{I}\| + \|\mathbf{F} - \mathbf{I}\| = 7 > \|\mathbf{L} - \mathbf{F}\| \qquad (0.0.3)$$

and triangle inequality is satisfied. Similarly, in $\triangle LIT$

$$\|\mathbf{L} - \mathbf{I}\| + \|\mathbf{T} - \mathbf{L}\| = 6.5 > \|\mathbf{T} - \mathbf{I}\| \qquad (0.0.4)$$

$$\|\mathbf{T} - \mathbf{L}\| + \|\mathbf{T} - \mathbf{I}\| = 6.5 > \|\mathbf{L} - \mathbf{I}\| \qquad (0.0.5)$$

$$\|\mathbf{L} - \mathbf{I}\| + \|\mathbf{T} - \mathbf{I}\| = 8 > \|\mathbf{L} - \mathbf{T}\| \qquad (0.0.6)$$

and triangle inequality is satisfied. $\therefore$ the given sides form a quadrilateral which can be constructed using approach in Problem 1.3 to obtain vertices of $\triangle LIF$ and $\triangle LIT$ as

$$\mathbf{L} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{I} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, \mathbf{F} = \begin{pmatrix} 3.406 \\ 2.9406 \end{pmatrix}, \mathbf{T} = \begin{pmatrix} 0.781 \\ 2.374 \end{pmatrix},$$

$$(0.0.7)$$