Assignment 2

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Download all python codes from

https://github.com/ka−raja−babu/Matrix−Theory/tree/main/Assignment2/Codes

and latex-tikz codes from

https://github.com/ka−raja−babu/Matrix−Theory/tree/main/Assignment2

1 Question No. 32

Can you construct a quadrilateral $PQRS$ with $PQ = 3$,$RS = 3$,$PS = 7.5$,$PR = 8$ and $SQ = 4$?

2 Explanation

Let the vertices of quadrilateral $PQRS$ be $\mathbf{P}$,$\mathbf{Q}$,$\mathbf{R}$ and $\mathbf{S}$.

According to given data:

$$\|\mathbf{P}-\mathbf{Q}\| = 3 \tag{2.0.1}$$

$$\|\mathbf{R}-\mathbf{S}\| = 3 \tag{2.0.2}$$

$$\|\mathbf{P}-\mathbf{S}\| = 7.5 \tag{2.0.3}$$

$$\|\mathbf{P}-\mathbf{R}\| = 8 \tag{2.0.4}$$

$$\|\mathbf{S}-\mathbf{Q}\| = 4 \tag{2.0.5}$$

Quadrilateral $PQRS$ is made up of two triangles $\triangle PSQ$ and $\triangle PSR$ placed on base PS .

Now,in $\triangle PSR$:-

$$\|\mathbf{P}-\mathbf{S}\| + \|\mathbf{R}-\mathbf{S}\| = 7.5 + 3 = 10.5 > \|\mathbf{P}-\mathbf{R}\| \tag{2.0.6}$$

$$\|\mathbf{P}-\mathbf{R}\| + \|\mathbf{R}-\mathbf{S}\| = 8 + 3 = 11 > \|\mathbf{P}-\mathbf{S}\| \tag{2.0.7}$$

$$\|\mathbf{P}-\mathbf{S}\| + \|\mathbf{P}-\mathbf{R}\| = 7.5 + 8 = 15.5 > \|\mathbf{R}-\mathbf{S}\| \tag{2.0.8}$$

$\because$ Sum of any two sides is greater than third side in $\triangle PSR$.

$\therefore$ Construction of $\triangle PSR$ is possible.

Now,in $\triangle PSQ$:-

$$\|\mathbf{P}-\mathbf{S}\| + \|\mathbf{S}-\mathbf{Q}\| = 7.5 + 4 = 11.5 > \|\mathbf{P}-\mathbf{Q}\| \tag{2.0.9}$$

$$\|\mathbf{P}-\mathbf{S}\| + \|\mathbf{P}-\mathbf{Q}\| = 7.5 + 3 = 10.5 > \|\mathbf{S}-\mathbf{Q}\| \tag{2.0.10}$$

$$\|\mathbf{P}-\mathbf{Q}\| + \|\mathbf{S}-\mathbf{Q}\| = 3 + 4 = 7 < \|\mathbf{P}-\mathbf{S}\| \tag{2.0.11}$$

$\because$ Sum of two sides PQ and SQ is less than third side PS in $\triangle PSQ$.

$\therefore$ Construction of $\triangle PSQ$ is not possible.

Without $\triangle PSQ$, quadrilateral $PQRS$ cannot be constructed.

Hence,construction of quadrilateral $PQRS$ is not possible with the given values.

Figure 2.1 is plotted using approximate values of coordinates.This plot clearly concludes that construction of quadrilateral $PQRS$ is not possible with the given values.

Plot of the quadrilateral $PQRS$:

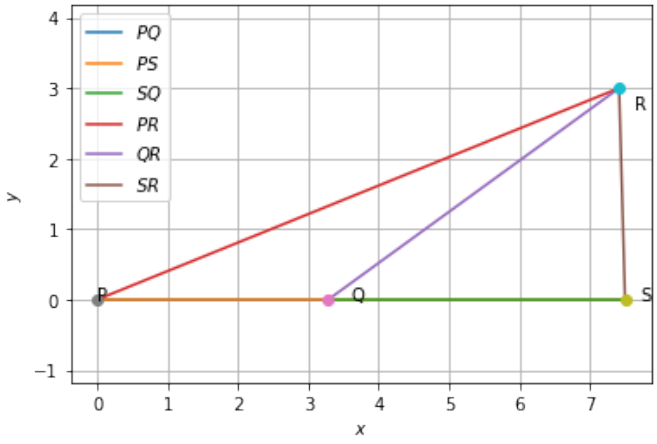

Fig. 2.1: Quadrilateral $PQRS$