

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 SOLUTION

- 1) Assume vertices of given quadrilateral:-
Let the vertices of quadrilateral $PQRS$ be P, Q, R and S .
- 2) List out given data in form of vectors:-
According to given data:

$$\|P - Q\| = 3 \quad (2.0.1)$$

$$\|R - S\| = 3 \quad (2.0.2)$$

$$\|P - S\| = 7.5 \quad (2.0.3)$$

$$\|P - R\| = 8 \quad (2.0.4)$$

$$\|S - Q\| = 4 \quad (2.0.5)$$

- 3) Find out two triangles of given quadrilateral having same base

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

- 4) Verify that construction of both triangles, is possible or not by using the fact that "sum of any two sides of a triangle is greater than third side":-

Now, in $\triangle PSR$:-

$$\|P - S\| + \|R - S\| = 7.5 + 3 = 10.5 > \|P - R\| \quad (2.0.6)$$

$$\|P - R\| + \|R - S\| = 8 + 3 = 11 > \|P - S\| \quad (2.0.7)$$

$$\|P - S\| + \|P - R\| = 7.5 + 8 = 15.5 > \|R - S\| \quad (2.0.8)$$

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

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

Now, in $\triangle PSQ$:-

$$\|P - S\| + \|S - Q\| = 7.5 + 4 = 11.5 > \|P - Q\| \quad (2.0.9)$$

$$\|P - S\| + \|P - Q\| = 7.5 + 3 = 10.5 > \|S - Q\| \quad (2.0.10)$$

$$\|P - Q\| + \|S - Q\| = 3 + 4 = 7 < \|P - S\| \quad (2.0.11)$$

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

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

- 5) Conclude that construction of quadrilateral is possible if both triangles can be constructed otherwise not possible:-
Without $\triangle PSQ$, quadrilateral $PQRS$ cannot be constructed. Hence, construction of quadrilateral $PQRS$ is not possible with the given values.

- 6) Plot approximate figure of quadrilateral by using assumptions:-

Ordinate of Q vertex comes imaginary. To plot approximate figure, we assume only real value of ordinate (i.e. zero) disregarding its imaginary part. Due to this assumption, P, Q and S appear collinear in fig. 2.1.

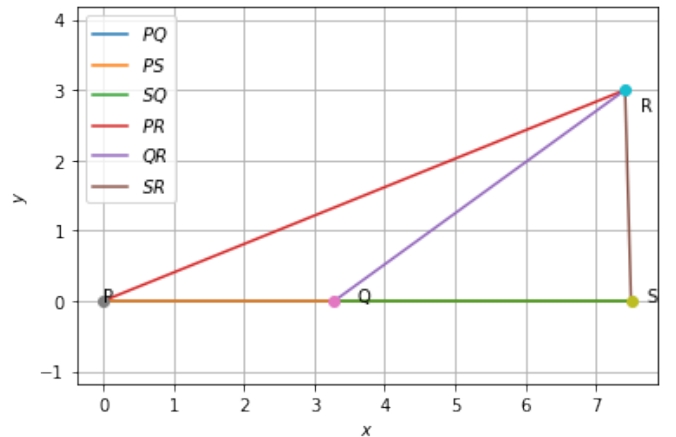


Fig. 2.1: Approximate quadrilateral $PQRS$