

Challenge Problem-1(EE5600)

Satyam Singh
EE20MTECH14015

Abstract—This assignment deals with basic coordinate geometry.

Download tex file from

<https://github.com/satyam463/EE5600Ass1/blob/main/challengeproblem1.tex>

1 PROBLEM STATEMENT

1.1 Vector2, Example-1, 21

Find the coordinates of the point which divides internally and externally, line joining the points $(a+b, a-b)$ to the point $(a-b, a+b)$ in the ratio $a:b$.

2 SOLUTION

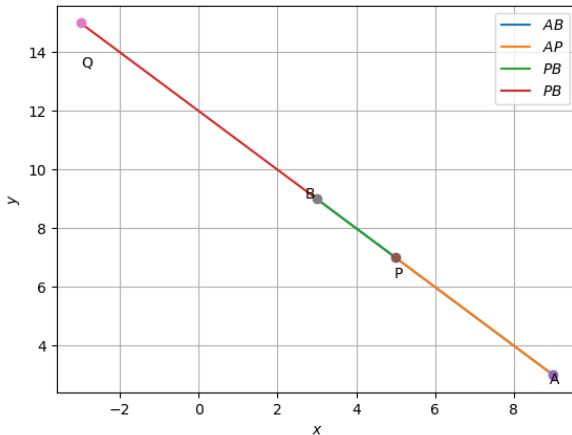


Fig. 0: Line joining AB with $A\begin{pmatrix} 9 \\ 3 \end{pmatrix}$, $B\begin{pmatrix} 3 \\ 9 \end{pmatrix}$ where as $\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 6 \\ 3 \end{pmatrix}$ are used for python plot. The point of section $P(\text{internally}) = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$, $Q(\text{externally}) = \begin{pmatrix} -3 \\ 15 \end{pmatrix}$.

Given:

$$A = \begin{pmatrix} a+b \\ a-b \end{pmatrix}, B = \begin{pmatrix} a-b \\ a+b \end{pmatrix} \quad (2.0.1)$$

The line joining AB divided into the ratio $a:b$ at point of division $P(\text{say})$ internally can be written by using section formula

$$P = \frac{aB + bA}{a+b} \quad (2.0.2)$$

$$P = \frac{1}{a+b} (B \ A) \begin{pmatrix} a \\ b \end{pmatrix} \quad (2.0.3)$$

Now, the line joining AB divided into the ratio $a:b$ at point of division $Q(\text{say})$ externally can be written by using section formula

$$Q = \frac{aB - bA}{a-b} \quad (2.0.4)$$

$$Q = \frac{1}{a-b} (B \ A) \begin{pmatrix} a \\ -b \end{pmatrix} \quad (2.0.5)$$