

Assignment 1

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1 Assignment 1

Question 21 : Find the coordinates of the points which divide, internally and externally, the line joining the point $(a+b, a-b)$ to the point $(a-b, a+b)$ in the ratio $a: b$.

Solution :

Let us consider P be the point which divides the AB line segment in the ratio $a: b$ internally and externally. Given that the coordinates of A point = $(a+b, a-b)$ and coordinates of B point = $(a-b, a+b)$.

So we can write **A** and **B** as product of a matrix and a vector,

$$\mathbf{A} = \left[\frac{1}{a+b} \begin{pmatrix} a-b & a+b \\ a+b & a-b \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} \right]^T \quad (1)$$

$$\mathbf{B} = \left[\frac{1}{a-b} \begin{pmatrix} a-b & a+b \\ a+b & a-b \end{pmatrix} \begin{pmatrix} a \\ -b \end{pmatrix} \right]^T \quad (2)$$

and

$$\frac{AP}{PB} = \frac{a}{b} \quad (3)$$

According to the Internal Division Section Formula, coordinates of **P**:

$$\mathbf{P} = \left(\frac{a(a-b) + b(a+b)}{a+b}, \frac{a(a+b) + b(a-b)}{a+b} \right) \quad (4)$$

According to the External Division Section Formula, coordinates of **P**:

$$\mathbf{P} = \left(\frac{a(a-b) - b(a+b)}{a-b}, \frac{a(a+b) - b(a-b)}{a-b} \right) \quad (5)$$

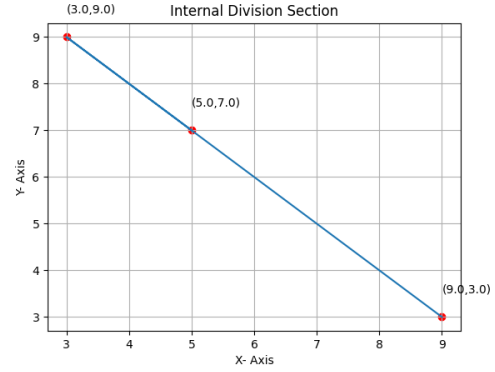


Figure 1: Internal Division Section

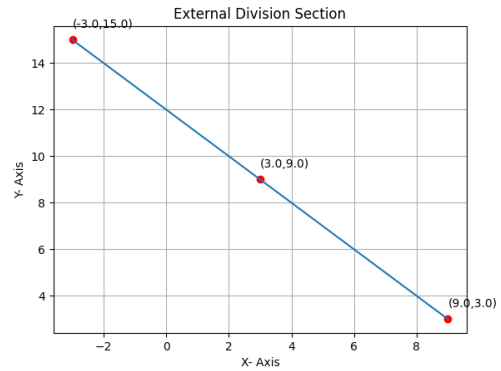


Figure 2: External Division Section