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,

$$\mathbf{A} = \left[\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} \right]^\top \tag{1}$$

$$\mathbf{B} = \left[\begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} \right]^\top \tag{2}$$

and

$$\frac{AP}{PB} = \frac{a}{b} \tag{3}$$

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

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

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

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

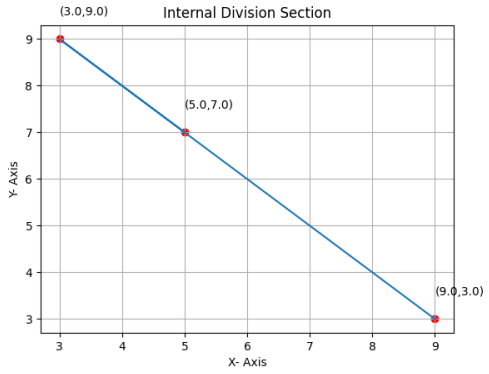

Figure 1: Internal Division Section

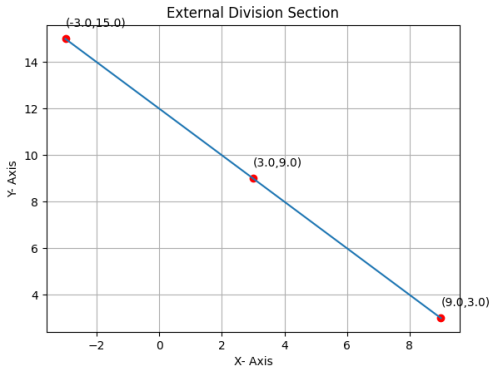

Figure 2: External Division Section