Assignment-2

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$\mathbf{P}(5,-3)$ and $\mathbf{Q}(3,y)$ are the points of trisection of the line segment joining $\mathbf{A}(7,-2)$ and $\mathbf{B}(1,-5)$. Theny equals

Solution: Given $\mathbf{P}(5,-3)$, $\mathbf{A}(7,-2)$, $\mathbf{B}(1,-5)$ and $\mathbf{Q}(3,y)$

Also given that $\mathbf{P}and\mathbf{Q}$ are the points of tricection of AB.

Let q divides the line segment AB in the ratio $k:1$. That implies p divides line segment AB in the ratio $1:k$.

$$\implies p = \frac{ka+b}{k+1} \tag{1}$$

$$\implies \begin{pmatrix}5\\-3\end{pmatrix} = \frac{k\begin{pmatrix}7\\-2\end{pmatrix}+\begin{pmatrix}1\\-5\end{pmatrix}}{k+1} \tag{2}$$

$$\tag{3}$$

lets solve x coordinate

$$\implies 5 = \frac{7k+1}{k+1} \tag{4}$$

$$\implies 5k+5 = 7k+1 \tag{5}$$

$$\implies k = 2 \tag{6}$$

Therefore q divides AB in the ratio $2:1$

$$\implies \begin{pmatrix}3\\y\end{pmatrix} = \frac{b+\frac{1}{2}a}{1+\frac{1}{2}+1} \tag{7}$$

$$\tag{8}$$

lets solve y coordinate of q

$$\implies y = \frac{(-5)+(-2)\frac{1}{2}}{\frac{3}{2}} \tag{9}$$

$$\implies y = \frac{-12}{3} \tag{10}$$

Therefore $y = -4$