CHAPTER-7
COORDINATE GEOMETRY

Excercise 7.2.9

1. Find the coordinates of the point which divides the line segment joining $(-2, 2)$ and $(2, 8)$ into four equal parts

Solution:
Let the points A,B,C which divide the line into 4 equal parts

Ratio of PAQ = 3:1

Ratio of PBQ = 2:2

Ratio of PCQ = 1:3

coordinates and ratio are given as:

$$\mathbf{P} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 2 \\ 8 \end{pmatrix}, n1 = \frac{3}{1}, n2 = \frac{2}{2}, n3 = \frac{1}{3} \tag{1}$$

Using section formula for n1:

$$\mathbf{R} = \frac{\mathbf{Q} + n\mathbf{P}}{1+n} \tag{2}$$

$$= \frac{1}{1+\frac{3}{1}} \left(\begin{pmatrix} 2 \\ 8 \end{pmatrix} + \frac{3}{1} \begin{pmatrix} -2 \\ 2 \end{pmatrix} \right) \tag{3}$$

$$= \frac{1}{\frac{4}{1}} \left(\begin{pmatrix} 2 \\ 8 \end{pmatrix} + \frac{1}{1} \begin{pmatrix} -6 \\ 6 \end{pmatrix} \right) \tag{4}$$

$$= \frac{1}{4} . \begin{pmatrix} -4 \\ 14 \end{pmatrix} \tag{5}$$

$$= \begin{pmatrix} -1 \\ \\ \frac{7}{2} \end{pmatrix} \tag{6}$$

Using section formula for n2:

$$\mathbf{R} = \frac{\mathbf{Q} + n\mathbf{P}}{1+n} \tag{7}$$

$$= \frac{1}{1+\frac{2}{2}}\left(\begin{pmatrix}2\\8\end{pmatrix} + \frac{2}{2}\begin{pmatrix}-2\\2\end{pmatrix}\right) \tag{8}$$

$$= \frac{1}{\frac{4}{2}}\left(\begin{pmatrix}2\\8\end{pmatrix} + \frac{1}{1}\begin{pmatrix}-2\\2\end{pmatrix}\right) \tag{9}$$

$$= \frac{1}{2}.\begin{pmatrix}0\\10\end{pmatrix} \tag{10}$$

$$= \begin{pmatrix}0\\5\end{pmatrix} \tag{11}$$

Using section formula for n3:

$$\mathbf{R} = \frac{\mathbf{Q} + n\mathbf{P}}{1+n} \tag{12}$$

$$= \frac{1}{1+\frac{1}{3}}\left(\begin{pmatrix}2\\8\end{pmatrix} + \frac{1}{3}\begin{pmatrix}-2\\2\end{pmatrix}\right) \tag{13}$$

$$= \frac{1}{\frac{4}{3}}\left(\begin{pmatrix}2\\8\end{pmatrix} + \begin{pmatrix}\frac{-2}{3}\\\\\frac{2}{3}\end{pmatrix}\right) \tag{14}$$

$$= \frac{3}{4}.\begin{pmatrix}\frac{4}{3}\\\\\frac{26}{3}\end{pmatrix} \tag{15}$$

$$= \begin{pmatrix}1\\\\\frac{13}{2}\end{pmatrix} \tag{16}$$

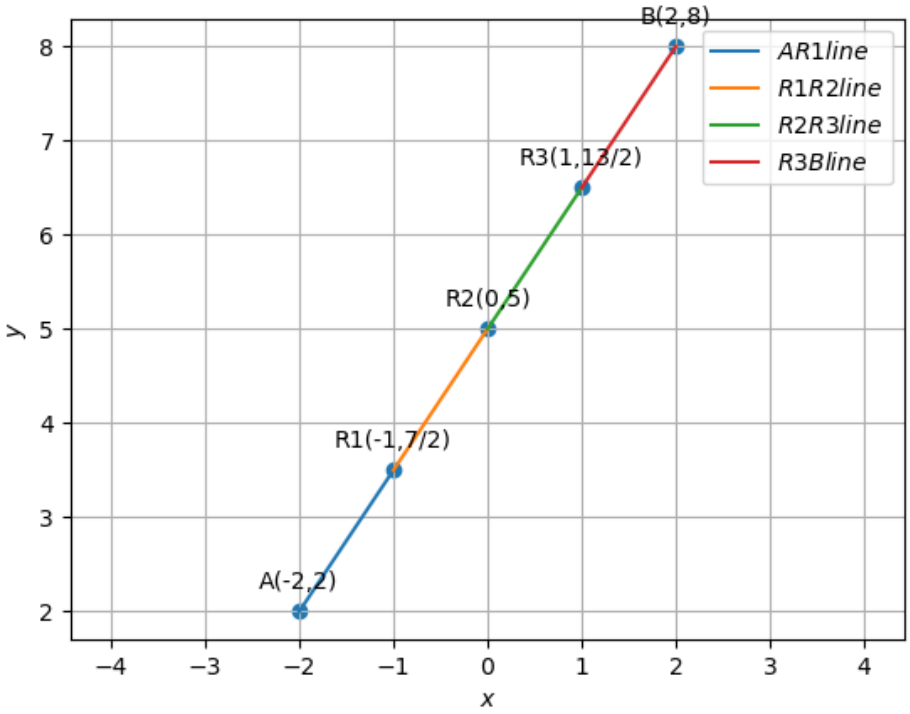
B(2,8)
AR1line
R1R2line
R2R3line
R3Bline
R3(1,13/2)
R2(0,5)
R1(-1,7/2)
A(-2,2)
y
x

Figure 1: