Coordinate Geometry

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10^{th} Maths - Chapter 7

This is Problem-9 from Exercise 7.2

1. Find the coordinates of the points which divide the line segment joining A (- 2, 2) and B (2, 8) into four equal parts.
   Solution:
   Given Data:A = $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$
   B = $\begin{pmatrix} 2 \\ 8 \end{pmatrix}$
   To find:C,D,E = ?

let,k=1 Now,

$$C = \frac{A + kB}{k + 1} \tag{1}$$

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

$$= \frac{\begin{pmatrix} -2 \\ 2 \end{pmatrix} + \begin{pmatrix} 2 \\ 8 \end{pmatrix}}{2} \tag{3}$$

$$= \frac{\begin{pmatrix} 0 \\ 10 \end{pmatrix}}{2} \tag{4}$$

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

$$C = (0, 5) \tag{6}$$

now,

$$D = \frac{A + kC}{k + 1} \tag{7}$$

$$D = \frac{\begin{pmatrix} -2 \\ 2 \end{pmatrix} + 1 \begin{pmatrix} 0 \\ 5 \end{pmatrix}}{(1 + 1)} \tag{8}$$

$$= \frac{\begin{pmatrix} -2 \\ 2 \end{pmatrix} + \begin{pmatrix} 0 \\ 5 \end{pmatrix}}{2} \tag{9}$$

$$= \frac{\begin{pmatrix} -2 \\ 7 \end{pmatrix}}{2} \tag{10}$$

$$= \begin{pmatrix} -1 \\ \frac{7}{2} \end{pmatrix} \tag{11}$$

$$D = (-1, \frac{7}{2}) \tag{12}$$

Similarly,the third point

$$E = \frac{C + kB}{k+1} \tag{13}$$

$$E = \frac{\begin{pmatrix}0\\5\end{pmatrix} + 1\begin{pmatrix}2\\8\end{pmatrix}}{(1+1)} \tag{14}$$

$$= \frac{\begin{pmatrix}0\\5\end{pmatrix} + \begin{pmatrix}2\\8\end{pmatrix}}{2} \tag{15}$$

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

$$= \begin{pmatrix}2\\\frac{13}{2}\end{pmatrix} \tag{17}$$

$$E = (2, \frac{13}{2}) \tag{18}$$

therefore,the thre points which divide AB into four equal parts are:
C = (0,5), D = $(-1, \frac{7}{2})$, E = $(2, \frac{13}{2})$