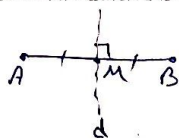


$A(1, -1) \quad B(2, 1)$



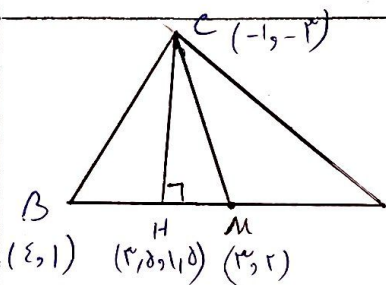
$$\rightarrow m_{AB} = \frac{1 - (-1)}{2 - 1} = 2 \rightarrow m_d \times m_{AB} = -1 \rightarrow m_d = -\frac{1}{2} \quad \left. \begin{array}{l} \rightarrow d: y = -\frac{1}{2}x + \frac{5}{2} \\ \rightarrow y = x + 2 \end{array} \right\} \rightarrow M(2, 1)$$

$A(2, 1) \quad B(-1, 2) \quad C(-1, 3) \rightarrow BC: y = -\frac{1}{2}x + \frac{5}{2} \rightarrow 2y + x - 5 = 0$

$BC = \sqrt{(2 - (-1))^2 + (1 - 2)^2} = \sqrt{10} = \sqrt{10}$

$AH = BC: A \text{ to } BC \rightarrow AH = \frac{|2 \times 1 + (-1) \times 3 - 5|}{\sqrt{2^2 + 1^2}} = \frac{10}{\sqrt{5}} = 2\sqrt{5}$

$BC - AH = 2\sqrt{5}$



$\rightarrow M(\frac{2+(-1)}{2}, \frac{1+2}{2}) = (\frac{1}{2}, \frac{3}{2})$

$m_{AB} = \frac{1 - 2}{2 - (-1)} = -1 \rightarrow AB: y = -x + 3$

$A(2, 1) \rightarrow AB \perp CH \rightarrow m_{CH} = 1 \rightarrow CH: y = x - 2$

$\rightarrow -x + 3 = x - 2 \rightarrow 5 = 2x \rightarrow x = \frac{5}{2} \rightarrow H(\frac{5}{2}, \frac{1}{2}) \rightarrow MH = \sqrt{(\frac{5}{2} - \frac{1}{2})^2 + (\frac{1}{2} - \frac{3}{2})^2} = \sqrt{2}$

$L_1: 2y - 3x = 12 \rightarrow L_1 \parallel L_2 \rightarrow \frac{a}{a'} = \frac{b}{b'} \rightarrow \frac{2}{-3} = \frac{-1}{a'} \rightarrow a' = \frac{3}{2}$

$L_2: 2y - ax = 2$

$\text{فاصله} = \frac{|C - C'|}{\sqrt{a^2 + b^2}} = \frac{|12 - 2|}{\sqrt{3^2 + 2^2}} = \frac{10}{\sqrt{13}} = \frac{10\sqrt{13}}{13} \rightarrow r = \frac{10\sqrt{13}}{13}$

$\rightarrow S = \pi r^2 = \pi \times \frac{100 \times 13}{169} = \frac{1000\pi}{13}$

$(3m - 2)x + (8 - m)y - 5 = 0 \rightarrow m = \frac{2 - 3m}{8 - m} \rightarrow mm' = -1$

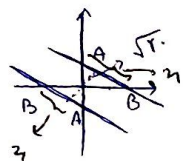
$(m + 1)x - (3m - 2)y + 1 = 0 \rightarrow m' = \frac{m + 1}{3m - 2} \rightarrow \frac{2 - 3m}{8 - m} \times \frac{m + 1}{3m - 2} = -1$

$\rightarrow \frac{-3m^2 - m + 2}{-3m^2 + 12m - 2} = -1 \rightarrow -3m^2 - m + 2 = 3m^2 - 12m + 2 \rightarrow -6m^2 + 11m = 0 \rightarrow m = 0 \text{ or } m = \frac{11}{6}$

$\rightarrow m = -1 \quad m = \frac{11}{6} \rightarrow m = \frac{11}{6}$

$$\begin{cases} AB: x+2y=2 \\ AC: y=2x-1 \\ BC: x+y=2 \end{cases} \rightarrow \begin{cases} -\frac{x}{2} + \frac{y}{2} = 2x-1 \rightarrow 2,8x = \frac{8}{2} \rightarrow x=1 \rightarrow A(1,1) \\ 2x-1 = -x+2 \rightarrow 3x=3 \rightarrow x=1 \rightarrow C(\frac{8}{3}, \frac{5}{3}) \\ -\frac{x}{2} + \frac{y}{2} = -x+2 \rightarrow \frac{x}{2} = \frac{8}{2} \rightarrow x=8 \rightarrow B(8,-1) \end{cases} \rightarrow M(\frac{1}{3}, \frac{2}{3})$$

$$\frac{AM}{AH} = \frac{\sqrt{(\frac{5}{3})^2 + (-\frac{1}{3})^2}}{\frac{|1+1-2|}{\sqrt{1+1}}} = \frac{\sqrt{\frac{25+1}{9}}}{\frac{2}{\sqrt{2}}} = \frac{\sqrt{\frac{26}{9}}}{\frac{2}{\sqrt{2}}} = \frac{\frac{\sqrt{26}}{3}}{\frac{2}{\sqrt{2}}} = \frac{\sqrt{26}}{6} = \frac{10}{6} = \frac{5}{3}$$



$$\rightarrow |B| \times |A| = \sqrt{2} \times |AB| \rightarrow |B| \times |A| = \sqrt{2} \times 2$$

$$\rightarrow |B| = 2|A| \rightarrow 2 \times |A|^2 = \sqrt{2} \times \sqrt{2^2 + 2^2} \rightarrow 2|A|^2 = \sqrt{2} \times \sqrt{8} = \sqrt{2} \times 2\sqrt{2} = 4$$

$$\rightarrow 2|A|^2 = 4 \rightarrow |A|^2 = 2 \rightarrow |A| = \sqrt{2} \rightarrow |B| = 2\sqrt{2} \rightarrow |AB| = \sqrt{2^2 + 2^2} = \sqrt{8}$$

عرض از مبدأ هر دو (2) است. پس هر دو از نقطه (2,0) می گذرند. از این جا می توان گفت که
دو خط موازی آن $\frac{8}{2}$ است

$$\begin{cases} y = \frac{2}{m}x + 2 \\ y = (1-m)x + 2 \end{cases}$$

$$\rightarrow (1-m)x_1 + 2 = 0 \rightarrow x_1 = \frac{-2}{1-m}, \quad \frac{2}{m}x_2 + 2 = 0 \rightarrow x_2 = \frac{-2}{m} \rightarrow |x_1 - x_2| = \frac{2}{m}$$

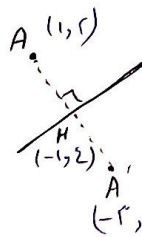
$$\rightarrow \left| \frac{-2}{1-m} + \frac{2}{m} \right| = \frac{8}{2} \rightarrow \begin{cases} \frac{m^2 - m + 2}{m^2 - m} = \frac{8}{2} \rightarrow 2m^2 - 2m + 4 = 0 \rightarrow m^2 - m + 2 = 0 \rightarrow m = 3 \\ \frac{m^2 - m + 2}{m^2 - m} = -\frac{8}{2} \rightarrow 2m^2 + 2m - 4 = 0 \rightarrow m^2 + m - 2 = 0 \rightarrow m = -1 \end{cases}$$

$$y = 2x - 2 \quad M(2, -2)$$

$$m' = 2 \xrightarrow{x=1} A(1, -1) \rightarrow A'(2, -2)$$

$$\rightarrow y' = 2x + b \xrightarrow{(2, -2)} y' = 2x - 4$$

$$A(1, 2)$$



$$AH: y = -x + b \xrightarrow{(1, 2)} y = -x + 3$$

$$y = x + 8$$

$$\rightarrow -x + 3 = x + 8 \rightarrow x = -1 \rightarrow H(-1, 4)$$

$$\rightarrow A'(-2, 4) \rightarrow \begin{cases} a = -2 \\ b = 4 \end{cases} \rightarrow 2b - a = 12 + 2 = 14$$