

۱- نقطه وسط m | $\frac{x_1+x_2}{2} = 3$ $\frac{1+4}{2} = 1$ m | $\frac{y_1+y_2}{2} = 1$ AB شیب $= \frac{4-1}{4-2} = -\frac{3}{2} = -\frac{3}{2}$

$\rightarrow MH = \frac{1}{\frac{3}{2}} \rightarrow \frac{1}{\frac{3}{2}} \times 3 + b = 1 \rightarrow b = \frac{5}{3}$ $y = \frac{1}{\frac{3}{2}}x + \frac{5}{3}$

۲ BC طول $= \sqrt{(-1+4)^2 + (3-1)^2} = \sqrt{9+4} = \sqrt{13} = \omega$ $m_{BC} = \frac{3-1}{-1+4} = -\frac{2}{3}$

$\rightarrow y-1 = -\frac{2}{3}(x+1) \rightarrow 3y-3 = -2x-2 \rightarrow 2x+3y-1=0 \rightarrow B$ معادله خط

$AH = BC$ فاصله A تا خط $BC = \frac{|2 \times 1 + 3 \times 1 - 1|}{\sqrt{2^2 + 3^2}} = \frac{2}{\sqrt{13}} = \frac{2}{\omega}$ $\omega = 2$

۳ $xy - ax - k = 0$ $xy - x - V = 0$ $\frac{1}{r} = \frac{a}{r} \rightarrow a = 1$

$m = \frac{a}{r}$ $m = \frac{1}{r}$ $\frac{xy - ax - k}{\sqrt{1+a^2}} = \frac{y}{\sqrt{1+a^2}} = \frac{y}{\sqrt{2}} = \frac{1}{\sqrt{2}}$

مساحت $= \frac{y}{r} = \frac{1}{\sqrt{2}}$ $S = \pi r^2 = \pi \times (\frac{1}{\sqrt{2}})^2 = \frac{\pi}{2}$

۴ AB شیب $= \frac{\Delta y}{\Delta x} = -1 \rightarrow$ CH شیب $= 1$ و $C(-1, -3) \rightarrow -1 \times 1 + b = -3 \rightarrow b = -2$

N محل $CH = y = x - 2$ AB شیب $= -1$ و $B(3, 1) \rightarrow b = 1 + 1 = 2$ N محل $AB = y = -x + 2$

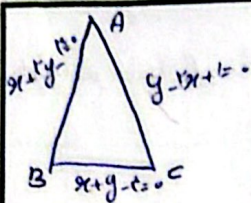
$H \rightarrow \begin{cases} y = -x + 2 \\ y = x - 2 \end{cases} \rightarrow y = \frac{3}{2}$ $x = \frac{1}{2}$ $M = \left(\frac{1+3}{2}, \frac{3+1}{2} \right) = (2, 2)$

$MH = \sqrt{(\frac{1}{2}-2)^2 + (\frac{3}{2}-2)^2} = \sqrt{\frac{1}{4} + \frac{1}{4}} = \frac{\sqrt{2}}{2}$

۵ $(3m-2)x + (a-m)y - V = 0 \rightarrow m = \frac{3-2m}{a-m}$ $(m+1)x - (2m-1)y + 1 = 0 \rightarrow m' = -\frac{1}{2}m$

عکس و برعکس $\frac{1}{m'} = \frac{3-2m}{1+m} \rightarrow \frac{1}{m'} = \frac{3-2m}{1+m} \rightarrow 1 - 2m - 10m + 2m^2 = 3 + 2m - 3m - 2m^2$

$\rightarrow am^2 - 12m + 11 = 0 \rightarrow \Delta < 0 \rightarrow$ هیچ مقدار m برهم نخوردند.



$$A \rightarrow \begin{cases} r-y = y+1 \\ x = 1 \end{cases} \quad A \mid \begin{matrix} 1 \\ 1 \\ 0 \end{matrix}$$

$$B \rightarrow \begin{cases} r-y = r-y \\ y = -1 \\ x = a \end{cases} \quad B \mid \begin{matrix} -1 \\ a \\ 0 \end{matrix}$$

$$C \rightarrow \begin{cases} r-x = r-x \\ x = \frac{a}{r} \\ y = \frac{r}{r} \end{cases} \quad C \mid \begin{matrix} \frac{a}{r} \\ \frac{r}{r} \\ 0 \end{matrix}$$

$$M \mid \begin{matrix} \frac{a+1}{r} = \frac{1}{r} \\ \frac{r-1}{r} = \frac{1}{r} \end{matrix} \rightarrow AM = \sqrt{\left(\frac{1}{r}-1\right)^2 + \left(\frac{1}{r}-1\right)^2}$$

$$\sqrt{\frac{4}{r^2} + \frac{1}{r^2}} = \frac{\sqrt{5}}{r}$$

$$AH = BC \sin A \sin 60 \rightarrow \frac{|1-1+1-1-1|}{\sqrt{1+1}} \cdot \frac{r}{\sqrt{r}} = \sqrt{r}$$

$$\frac{AM}{AH} = \frac{\frac{\sqrt{5}}{r}}{\frac{\sqrt{r}}{r}} = \frac{\sqrt{5}}{\sqrt{r}}$$

$$y = -\frac{1}{r}x + c \rightarrow \frac{x}{r} + y - c = 0 \xrightarrow{\text{نقطة}} \frac{|0+0-c|}{\sqrt{\frac{1}{r^2}+1}} = \frac{c}{\sqrt{a}} = \frac{rc}{\sqrt{a}}$$

$$\frac{rc}{\sqrt{a}} = \sqrt{r} \rightarrow rc = \sqrt{a} \times \sqrt{a} \rightarrow c = \frac{1}{r} = a$$

$$y = -\frac{1}{r}x + a \begin{cases} x=0 \rightarrow y=a \quad (\log a) \\ y=0 \rightarrow x=10 \quad (\log 10) \end{cases}$$

$$AB = \sqrt{100 + r^2} = a\sqrt{a}$$

$$my - rx = rm \rightarrow y = \frac{r}{m}x + r$$

$$mx + y = x + r \rightarrow y = (1-m)x + r$$

$$x=0 \rightarrow y_1 = y_r = r \quad \text{نقطة } A(0, r)$$

$$y_1 = \frac{r}{m}x + r = 0 \rightarrow x = -\frac{m}{r} \quad B(-\frac{m}{r}, 0)$$

$$y_r = (1-m)x + r = 0 \rightarrow x = -\frac{r}{1-m} \quad C(-\frac{r}{1-m}, 0)$$

$$\text{نقطة } = BC$$

$$EC = r \rightarrow \frac{1}{r} \times \left| -\frac{r}{1-m} + \frac{m}{r} \right| \times r = \frac{a}{r}$$

$$\rightarrow \left| -\frac{r}{1-m} + \frac{m}{r} \right| = \frac{a}{r} \rightarrow \left| \frac{m^2 - m + r}{r(1-m)} \right| = \frac{a}{r} \xrightarrow{\times r} \left| \frac{m^2 - m + r}{1-m} \right| = a$$

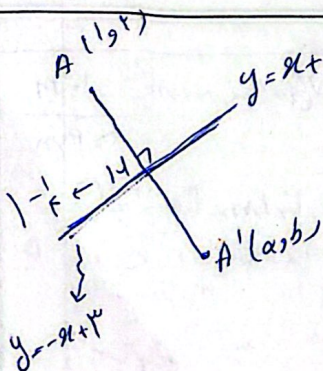
$$\rightarrow m^2 - m + r = a(1-m) \rightarrow (m-r)^2 = 0 \rightarrow m = r \quad \begin{cases} m = r = \frac{-r-\sqrt{a}}{2} \\ m = r = \frac{-r+\sqrt{a}}{2} \end{cases}$$

$$m_1 \times m_2 \times m_3 = (-r+\sqrt{a})(-r-\sqrt{a})(r) = -1 \times r = -r$$

$$\text{نقطة } A(0, r) \rightarrow (0, -r) \xrightarrow{\frac{-r}{m}} r = \frac{0+x_B}{r} \rightarrow x_B = r \quad -r = -\frac{r+y_B}{r} \rightarrow y_B = -1$$

$$\therefore m = r \quad \text{نقطة } (r, -1) \rightarrow y = rx - 9$$

$$\begin{cases} rx + b = -1 \\ b = -9 \end{cases}$$



$$\begin{pmatrix} -1 \\ r \end{pmatrix} = \frac{1+a}{r} \rightarrow a = -r$$

$$\frac{r+b}{r} \rightarrow b = 9$$

$$rb - a = 1r + r = 1a$$