

$$1) \quad m = \frac{-4-1}{1-2} = 5 \rightarrow m' = \frac{1}{5}$$

$$M: x_m = \frac{1+2}{5} = \frac{3}{5}, y_m = \frac{1-4}{5} = -\frac{3}{5} \rightarrow (3, 1)$$

$$\left. \begin{aligned} &\rightarrow y - 1 = \frac{1}{5}(x - 3) \\ &y = \frac{1}{5}x - \frac{3}{5} + \frac{5}{5} \Rightarrow y = \frac{1}{5}x + \frac{2}{5} \end{aligned} \right\}$$

$$BC: \sqrt{\frac{(4-1)^2}{16} + \frac{(-2+1)^2}{9}} = \frac{5}{6}$$

$$m_{BC}: m = \frac{4-2}{-2+1} = -2 \rightarrow y - 2 = -2(x - 1) \rightarrow y - 2 = -2x + 2 \rightarrow y + 2x - 4 = 0$$

$$2) \quad AH: \text{مساحت: } \left[\frac{|3(1) + 2(2) - 4|}{\sqrt{9+16}} \right] = \frac{4}{5}$$

$$\rightarrow \frac{4}{5} = \frac{4}{5} \times \frac{2 \times 5 - 4}{5} \times \frac{1}{4} \times \frac{1}{4}$$

$$S = \pi r^2 \quad E_y = ax + 2, \quad x_y = x + 1 \rightarrow \text{خطوط موازی} \rightarrow \frac{a}{1} = \frac{1}{1} \rightarrow a = 1$$

$$3) \quad E_y = x + 2 \rightarrow x_y = x + 1$$

$$\text{مساحت خطوط موازی: } \left[\frac{|4-1|}{\sqrt{1+1}} \right] = \frac{4}{\sqrt{2}} \rightarrow r = \frac{2}{\sqrt{2}} \rightarrow S = \pi \left(\frac{2}{\sqrt{2}} \right)^2 = \frac{4}{2} \pi$$

$$4) \quad AB \perp CH \rightarrow m' = 1$$

$$M: x_m = \frac{2+2}{2-2} = -1, y_m = \frac{2+1}{2-2} = 1 \rightarrow M(2, 2)$$

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

$$\text{مساحت: } \left[\frac{|3-2-2|}{\sqrt{2}} \right] = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$(a-m)y = (r-x_m)x + 1 \rightarrow \frac{1}{a-m} = \frac{r-x_m}{a-m}$$

$$(r-m-x)y = (m+1)x + 1 \rightarrow \frac{1}{r-m-x} = \frac{m+1}{r-m-x}$$

$$\rightarrow \frac{r-x_m}{a-m} = \frac{r-x_m}{m+1} \rightarrow r-m-x_m^2 + r-x_m = r-m-x_m^2 - 1-m+2m^2 \rightarrow am^2 - 13m + 14 = 0$$

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$$A \text{ رأس: } \begin{cases} x+y = 2 \\ y-x = -1 \end{cases} \rightarrow A(1, 1)$$

$$B \text{ رأس: } \begin{cases} x+y = 2 \\ x+y = 1 \end{cases} \rightarrow B(0, 1)$$

$$4) \quad C \text{ رأس: } \begin{cases} x+y = 2 \\ y-x = 1 \end{cases} \rightarrow C(1, 1)$$

$$M \text{ نقطه: } \left(\frac{a+1}{2}, \frac{y-1}{2} \right) = \left(\frac{1}{2}, \frac{1}{2} \right)$$

$$AM \text{ طول: } \sqrt{\left(\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right)^2} = \frac{\sqrt{2}}{2}$$

$$AH \text{ طول: } \frac{|1+1-2|}{\sqrt{2}} = \frac{0}{\sqrt{2}} = 0 \rightarrow \frac{AM}{AH} = \frac{\frac{\sqrt{2}}{2}}{0}$$

$$y = -\frac{1}{2}x + b \rightarrow B(0, b)$$

$$\rightarrow A(2, b)$$

$$\text{فاصله: } \frac{|0+0-b|}{\sqrt{1+\frac{1}{4}}} = \sqrt{\frac{4}{5}} b = \sqrt{2} \Rightarrow b = \frac{\sqrt{2}}{2}$$

$$5) \rightarrow B(0, 2)$$

$$A(1, 0) \rightarrow AB = \sqrt{1^2 + 2^2} = \sqrt{5} = \sqrt{1 \times 5} = \sqrt{5}$$

$$\left. \begin{array}{l} y \leq \frac{1}{m}x + 2 \quad (A) \\ y \leq (1-m)x + 2 \quad (B) \end{array} \right\} \rightarrow \text{مقدار قطع: } (0, 2) \rightarrow \text{نقطه اشتراک}$$

۱) $x_A = -\frac{r}{m-1}, x_B = -\frac{r}{m-1} \rightarrow S = \frac{1}{r} |x_B - x_A| \leq \frac{2}{r}$

$$\rightarrow \frac{2}{r} \leq \left| \frac{m}{r} - \frac{r}{m-1} \right| \rightarrow \pm 2 \leq \frac{m^2 - m + 1}{m-1}$$

$$\left. \begin{array}{l} -\sqrt{2} - 2 \leq m \\ m \leq -2 + \sqrt{2} \\ m \leq 2 \end{array} \right\} \rightarrow S = 2$$

۲) $\begin{array}{l} \text{دقیقه} \\ \text{در خط} \end{array} : \begin{array}{l} (0, -2) \xrightarrow{\text{خط}} (1, -1) \\ (1, -1) \xrightarrow{\text{خط}} (2, -2) \end{array} \rightarrow m = \frac{-2+1}{1-0} = -1$

$$\rightarrow y+1 \leq 2(x-2) \rightarrow y \leq 2x-9$$

$$(1, 2) \rightarrow y \leq x+1$$

$$m \leq 1 \rightarrow m' \leq -1 \rightarrow (y-2) \leq -1(x-1) \rightarrow y \leq -x+3$$

$$\left\{ \begin{array}{l} y-x \leq 1 \\ y+x \leq 3 \end{array} \right\} \rightarrow \begin{array}{l} y \leq 1 \\ x \leq 1 \end{array}$$

۱۰) $\rightarrow -1 \leq \frac{1+a}{r} \rightarrow a \leq -2, \quad 1 \leq \frac{2+b}{r} \rightarrow b \geq 4 \Rightarrow A'(-2, 4)$

$$\rightarrow 2b-9 \leq 2(4)+2 \leq 10$$