۱)

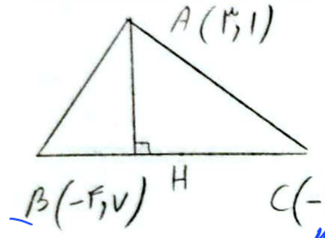
$A(4,-6)$, $B(2,8)$

$$m_{AB}=\frac{\Delta y}{\Delta x}=\frac{8-(-6)}{2-4}=\frac{14}{-2}=-7 \qquad m_{\text{عمود منصف}}=\frac{1}{7}$$

$$M=\left(\frac{4+2}{2},\frac{8-6}{2}\right)\Rightarrow M(3,1) \qquad y-1=\frac{1}{7}(x-3)\Rightarrow 7y-x-4=0$$

۲

۲)



$$BC=\sqrt{\Delta y^2+\Delta x^2}=\sqrt{25}=5 \rightarrow S=\frac{AH\times BC}{2}=5 \Rightarrow AH=2$$

$$S=\frac{1}{2}\left|3(4)-4(2)-1(-6)\right|=5$$

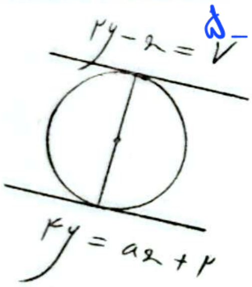
$m_{BC}=\frac{4}{-3}\rightarrow y+\frac{4}{3}x-\frac{5}{3}=0$

فاصله A از BC = ۲

طول ضلع BC ، ۴ واحد بیشتر از طول AH است

۱

۳)



$5-2=3$

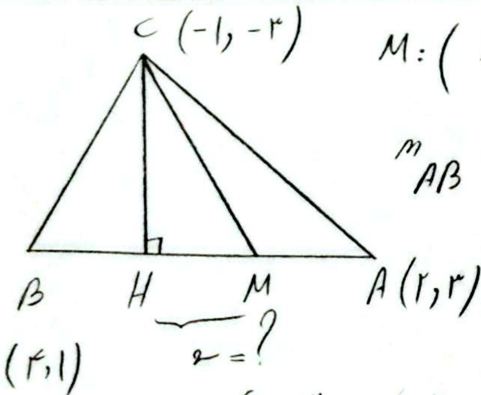
$$2y-x-7=0 \xrightarrow{\times 2} 4y-2x-14=0$$

$$4y-ax-2=0 \qquad d_{\text{قطر}}=\frac{|-14+2|}{\sqrt{16+4}}=\frac{12}{\sqrt{20}}=\frac{12\sqrt{20}}{20}=\frac{3\sqrt{20}}{5}$$

$$\Rightarrow r=\frac{\frac{3\sqrt{20}}{5}}{\frac{2}{1}}=\frac{3\sqrt{20}}{10} \qquad S_{\text{دایره}}=\pi r^2=\left(\frac{3\sqrt{20}}{10}\right)^2\pi=1{,}8\pi$$

۲

۴)



$$M:\left(\frac{2+4}{2},\frac{3+1}{2}\right)\Rightarrow M:(3,2)$$

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

$$y-3=-1(x-2)\Rightarrow y=-x+5$$

حل دستگاه ⇐

$$\begin{cases} y=x-2 \Rightarrow y=\frac{3}{2} \\ y=-x+5 \Rightarrow x=\frac{7}{2} \end{cases} \quad 2y=3$$

مختصات نقطه H

$$d_{MH}=\sqrt{\left(\frac{7}{2}-\frac{6}{2}\right)^2+\left(\frac{3}{2}-\frac{4}{2}\right)^2}$$

جواب $\frac{\sqrt{2}}{2}$

۲

(۵)

$(m+1)x-(2m-3)y+1=0$

$(2m-1)x+(5-m)y-7=0$

$\Rightarrow \frac{-m-1}{-2m+3} \times \frac{-2m+3}{5-m} = -1$

۲

$\frac{2m^2+m-1}{2m^2-13m+20} = -1 \Rightarrow 2m^2+m-1 = -2m^2+13m-20$

$\Rightarrow 4m^2-12m+18=0$

$\Rightarrow \Delta: 144-4(4)(18) \Rightarrow \Delta<0 \Rightarrow$ در این حالت هیچ مقداری از m

(۶)

$\begin{cases} AB: x+2y=3 \\ AC: y=2x-1 \\ BC: x+y=3 \end{cases} \Rightarrow$ محل برخورد AC و AB: $x+2(2x-1)=3 \Rightarrow x+4x-2=3$

$\Rightarrow x=1 \Big] / y=2(1)-1=1 \Big]$ $A(1,1)$

محل برخورد AB و BC: $\begin{cases} -x+y=3 \\ x+2y=3 \end{cases} \Rightarrow y=-1 \Big]$ $\Rightarrow x=5 \Big]$ $B(5,-1)$

۳

محل برخورد BC و AC: $\begin{cases} y-2x=-1 \\ -y+x=-3 \end{cases} \Rightarrow -2x=-5 \Rightarrow x=\frac{5}{2} \Big]$ $y=\frac{7}{2} \Big]$ $C\left(\frac{5}{2},\frac{7}{2}\right)$

M وسط BC: $\left(\frac{5+\frac{5}{2}}{2}, \frac{-1+\frac{7}{2}}{2}\right) = \left(\frac{10}{4}, \frac{5}{4}\right) \Rightarrow$ فاصله $AM = \sqrt{\left(\frac{7}{4}\right)^2+\left(-\frac{1}{4}\right)^2} = \sqrt{\frac{50}{9}} = \frac{5\sqrt{2}}{3}$

$AH: \frac{|1(1)+1(1)-4|}{\sqrt{1+1}} = \frac{2}{\sqrt{2}} = \sqrt{2}$ حاصل $\frac{AM}{AH} = \frac{\frac{5\sqrt{2}}{3}}{\frac{\sqrt{2}}{1}} = \frac{5}{3}$

(۷)

$m=-\frac{1}{2} \Rightarrow y=-\frac{1}{2}x+b$

فاصله مبدا از خط $\Rightarrow \sqrt{20} = \frac{|1(0)+\frac{1}{2}(0)-b|}{\sqrt{1^2+\left(-\frac{1}{2}\right)^2}} \Rightarrow$

$\sqrt{20} = \frac{|-b|}{\frac{\sqrt{5}}{2}} \Rightarrow b=\pm 10$

۵

معادله خط $\frac{x}{2b}+\frac{y}{b}=1$ $d_{AB} = \sqrt{(0-a)^2+(b-0)^2}$

$\Rightarrow d_{AB} = \sqrt{a^2+b^2} \rightsquigarrow \sqrt{(2b)^2+b^2} \Rightarrow \sqrt{5b^2} \rightsquigarrow d = \sqrt{5 \times 20} = 5\sqrt{5}$

(5)

8) (1) $my - 4x = 2m \rightsquigarrow -4x = 2m \Rightarrow x = \frac{-m}{2}$ / محل $x=0 \Rightarrow my = 2m \quad y = 2$ تقاطع محور yها

$y=0 \Leftarrow$ محل تقاطع با محور xها

(2) $y + mx = x + 2 \rightsquigarrow mx - x = 2 \Rightarrow x = \frac{2}{m-1}$ ($y=0$, $x(m-1)$) / محل تقاطع با محور yها $x=0 \quad y=2$

$$\begin{cases} S = \frac{1}{2} \times \left(\frac{-m}{2}\right) \times 2 = \frac{|-m|}{2} \rightsquigarrow \frac{|-m|}{2} = \frac{5}{2} \Rightarrow m_{(1)} = \pm 5 \\ S = \frac{1}{2} \times \left(\frac{2}{m-1}\right) \times 2 = \frac{2}{|m-1|} \rightsquigarrow \frac{2}{|m-1|} = \frac{5}{2} \Rightarrow 5m - 5 = 4 \quad \begin{cases} m = \frac{1}{5} \\ m_{(2)} = \frac{9}{5} \end{cases} \end{cases}$$

حاصلضرب $m_{(1)} \times m_{(2)} = -5 \times \frac{9}{5} \times 5 \times \frac{1}{5} = -9$

$S_D = \left|\frac{m^2 - m + 4}{2(m-1)}\right| \times 2 \times \frac{1}{2} = \frac{5}{2}$

$\hookrightarrow m = 3, \quad m^2 + 4m - 1 = 0 \downarrow \frac{c}{a} = -1$

$3 \times -1 = -3$

(1)

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9) $y = 2x - 3 \rightsquigarrow M(2, -2)$ / $m' = 2 \Rightarrow x = 0 \Rightarrow y = 2(0) - 3 = -3$

عرض از مبدا، شیب، x_1، y_1 / خط قرینه / دارای یک نقطه دلخواه

$A(0, -3)$

(2)

$A(0,-3) \quad M(2,-2) \quad A'(x', y')$

$$\begin{cases} x_M = \frac{x_A + x'}{2} = 2 = \frac{0 + x'}{2} \Rightarrow x' = 4 \\ y_M = \frac{y_A + y'}{2} = -2 = \frac{-3 + y'}{2} \Rightarrow y' = -1 \end{cases}$$

$\Rightarrow A'(4, -1)$ معادله خط قرینه $\rightsquigarrow y - (-1) = 2(x - 4) \Rightarrow y = 2x - 9$

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10) $A(1, 2)$ (x_1, y_1) $\quad y = x + 5$ (c) $\rightsquigarrow A'(a, b) \quad 2b - a = ?$

قرینه‌ها: $x_2 = y_1 - c$, $\quad y_2 = x_1 + c$

$x_2 = 2 - 5 = -3 \quad y_2 = 1 + 5 = 6$

$\hookrightarrow A'(-3, 6)$ (a, b) $\quad 2(6) - (-3) = 15$

(4)