

$A(4, -4)$ و $B(2, 8)$

وسط پاره خط: $(\frac{4+2}{2}, \frac{-4+8}{2}) = (3, 1)$

$\begin{cases} 2a+b=8 \\ 4a+b=-4 \end{cases} \rightarrow b=22, a=-7 \Rightarrow \text{شیب} = -7 \Rightarrow \text{شیب عمود} = \frac{1}{7}$

$\rightarrow \text{معادله محور عمود: } y-1 = \frac{1}{7}(x-3) \rightarrow y-1 = \frac{1}{7}x - \frac{3}{7} \rightarrow 7y-7 = x-3 \rightarrow 7y = x+4$

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$A(3, 1), B(-4, 5), C(-6, 3)$

ارتفاع AH وارد بر ضلع BC

$BC \rightarrow C-B: (-1, -4), 3-5 = (-3, -4) \rightarrow \sqrt{3^2+4^2} = \sqrt{9+16} = \sqrt{25} = 5$

$AH \rightarrow H: (\frac{5}{5}, \frac{-1}{5}) \rightarrow \frac{\sqrt{4^2+3^2}}{5} = \frac{\sqrt{16+9}}{5} = \frac{5}{5} = 1$

$AH \text{ ارتفاع } BC \rightarrow 5-2 = 3$

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$7y-x=7, 4y=2x+2 \quad S_{\text{دایره}} = ?$

$4y=2x+2 \rightarrow 4y-2x=2 \Rightarrow a=2$

$7y-x=7 \rightarrow 7y-2x=14$

$2r = \frac{|14-2|}{\sqrt{14+4}} = \frac{|12|}{\sqrt{18}} \rightarrow 2r = \frac{12}{3\sqrt{2}} \rightarrow 2r = \frac{4}{\sqrt{2}} \rightarrow r = \frac{2}{\sqrt{2}}$

$S = \pi r^2 = \pi \times (\frac{2}{\sqrt{2}})^2 \rightarrow$

$S = \frac{4}{1} \pi$

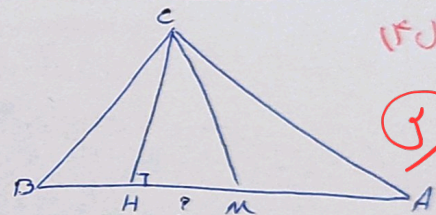
سوال (۳)

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$A(2, 3), B(4, 1), C(-6, -3)$

میان M: $(\frac{2+4}{2}, \frac{3+1}{2}) = (3, 2)$

$\begin{cases} y_{AB} = -x+5 \\ y_{CH} = x-2 \end{cases} \Rightarrow \begin{cases} 5-x=y \\ x-2=y \end{cases} \Rightarrow 5-x=x-2 \rightarrow 7=2x \rightarrow x=3.5$



سوال (۴)

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$\Rightarrow MH = \sqrt{(3.5-3)^2 + (1.5-2)^2} = \sqrt{(0.5)^2 + (-0.5)^2} = \sqrt{0.25+0.25} = \sqrt{0.5} = \frac{\sqrt{2}}{2}$

$(3m-2)x + (5-m)y - 7 = 0 \perp (m+1)x - (2m-4)y + 1 = 0$

$(3m-2)x + (5-m)y - 7 = 0 \rightarrow \text{شیب: } a = -\frac{3m-2}{5-m}$

$(m+1)x - (2m-4)y + 1 = 0 \rightarrow \text{شیب: } a' = \frac{m+1}{2m-4}$

عمود بودن: $aa' = -1 \rightarrow (-\frac{3m-2}{5-m})(\frac{m+1}{2m-4}) = 1 \rightarrow \frac{(3m-2)(m+1)}{(m-5)(2m-4)} = 1 \rightarrow (3m-2)(m+1) = (m-5)(2m-4)$

$\rightarrow 3m^2 + m - 2 = 2m^2 - 4m - 20 \rightarrow m^2 - 13m + 18 = 0 \rightarrow \Delta = 191$

معادله شیب عمود برای m و مقدار آن را در خط

m = ? سوال (۵)

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$\begin{cases} AB: x+y=3 \\ AC: y=2x-1 \\ BC: x+y=4 \end{cases} \quad \frac{AM}{AH} = ? \quad BC \rightarrow \begin{cases} \frac{2}{3}a+b=\frac{4}{3} \\ 5a+b=-1 \end{cases} \rightarrow 2b=8 \rightarrow b=4 \rightarrow a=-1 \rightarrow H(-1, 4)$

سوال (۶)

$\begin{cases} x+y=3 \\ y=2x-1 \end{cases} \rightarrow x+2(2x-1)=3 \rightarrow x+4x-2=3 \rightarrow 5x=5 \rightarrow x=1 \Rightarrow A(1, 2)$

$\frac{AM}{AH} = \frac{\frac{5\sqrt{2}}{3}}{\sqrt{2}} = \frac{5}{3}$

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$\begin{cases} x+y=3 \\ x+y=4 \end{cases} \rightarrow (x+y)-(x+y)=3-4 \rightarrow y=-1, x-1=4 \rightarrow x=5 \Rightarrow B(5, -1)$

$\begin{cases} y=2x-1 \\ x+y=4 \end{cases} \rightarrow x+(2x-1)=4 \rightarrow 3x=5 \rightarrow x=\frac{5}{3}, y=\frac{7}{3} \Rightarrow C(\frac{5}{3}, \frac{7}{3})$

$M: (\frac{5+\frac{5}{3}}{2}, \frac{-1+\frac{7}{3}}{2}) \rightarrow M: (\frac{10}{3}, \frac{2}{3}) \Rightarrow \frac{AM}{AH} = \sqrt{(\frac{10}{3}-1)^2 + (\frac{2}{3}-2)^2} = \sqrt{\frac{64}{9} + \frac{16}{9}} = \sqrt{\frac{80}{9}} = \frac{4\sqrt{5}}{3}$

سوال ۷

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شیب خط: $m = -\frac{1}{2}$ نامتواً خط: $\sqrt{2}$

$m = -\frac{1}{2} \rightarrow y = -\frac{1}{2}x + b \rightarrow -\frac{1}{2}x + b - y = 0 \rightarrow -x - 2y + 2b = 0$

نامتواً خط: $\sqrt{2}$ $\rightarrow \frac{|2b|}{\sqrt{2}} = \sqrt{2} \rightarrow 2b = 1 \rightarrow b = \frac{1}{2}$

$\Rightarrow x + 2y - 1 = 0$ $\begin{matrix} (0, \frac{1}{2}) \\ (1, 0) \end{matrix}$

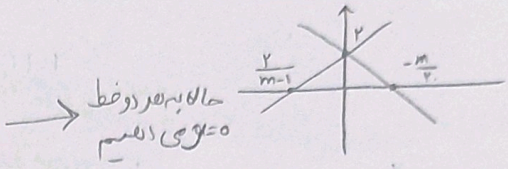
AB نامتواً = $\sqrt{(1-0)^2 + (0-\frac{1}{2})^2} = \sqrt{1 + \frac{1}{4}} = \sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{2}$

$my - 2x = 2m$, $y + mx = x + 2$ $S_A = \frac{2}{1}$

$y = \frac{2}{m}x + 2$

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

هر دو خط در نقطه‌ای
معمود و موازی



سوال ۸

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$S_{\text{مکمل}} = \frac{1}{2} \times \frac{1}{2} \times (1 - \frac{m}{2} - \frac{2}{m-1})$

$\rightarrow \left| \frac{m}{2} + \frac{2}{m-1} \right| = \frac{1}{2}$

$\frac{m^2 - m + 4}{2m - 2} = \frac{1}{2} \rightarrow m^2 - m + 4 = m - 2$ (۱)

$\frac{m^2 - m + 4}{2m - 2} = \frac{-1}{2} \rightarrow m^2 - m + 4 = -m + 2$ (۲)

① $\rightarrow m^2 - 4m + 6 = 0 \rightarrow (m-2)^2 = 0 \rightarrow m = 2$

② $\rightarrow m^2 + 3m - 2 = 0 \rightarrow \Delta = 33$

$\rightarrow -3$

$y = 2x - 3$ $u(2, -2)$

سوال ۹

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$x=1 \rightarrow y = 2(1) - 3 \rightarrow y = -1 \rightarrow (1, -1) \xrightarrow{\text{قرینه نسبت به } y} (3, -3)$

$x=0 \rightarrow y = 2(0) - 3 \rightarrow y = -3 \rightarrow (0, -3) \xrightarrow{\text{قرینه نسبت به } y} (4, -1)$

$(3, -3), (4, -1) \xrightarrow{\text{معادله خط}} \begin{matrix} 3a + b = -1 \\ 4a + b = -3 \\ \hline a = 2 \end{matrix}$

$\Rightarrow$ معادله قرینه خط: $y = 2x - 4$

$A(1, 2)$ $y = x + 5$ $A'(a, b)$ $2b - a = ?$

سوال ۱۰

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معادله خط عمود بر $y = x + 5$: $y = x + 5 \rightarrow$ شیب = ۱ $\rightarrow$ شیب عمود = -۱

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

$y = x + 5$ $\rightarrow x + 5 = -x + 3 \rightarrow 2x = -2 \rightarrow x = -1$ و $y = -(-1) + 3 \rightarrow y = 4 \rightarrow (-1, 4)$
 $y = -x + 3$ AA' نقطه وسط

$\frac{1+a}{2} = -1 \rightarrow 1+a = -2 \rightarrow a = -3 \Rightarrow A' : (-3, 4)$

$\frac{2+b}{2} = 4 \rightarrow 2+b = 8 \rightarrow b = 6$

$2b - a = 2(6) - (-3) = 12 + 3 = 15$