

$A(-2, K) \quad B(x, m) \quad \text{شیب: } -\frac{1}{4} \quad S_{ABCD} = ?$

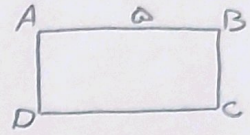
شیب خط: $\frac{m-K}{x-(-2)} = -\frac{1}{4} \rightarrow \frac{m-K}{x+2} = -\frac{1}{4} \rightarrow 4(m-K) = -(x+2) \rightarrow m-K = -\frac{x+2}{4}$

طول ضلع AB: $\sqrt{(x+2)^2 + (m-K)^2} = \sqrt{4^2 + (-\frac{x+2}{4})^2} = \sqrt{16 + \frac{(x+2)^2}{16}} = \sqrt{\frac{256 + (x+2)^2}{16}} = \frac{\sqrt{256 + (x+2)^2}}{4}$

مساحت مربع: $AB^2 = (3\sqrt{5})^2 = 45$

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$A(-1, 4) \quad B(3, 1) \quad C(x, y) \quad D(-1-x, y+2) \quad \text{مساحت مستطیل: ?}$



سوال ۲

طول ضلع AB: $\sqrt{(3+1)^2 + (1-4)^2} = \sqrt{4^2 + (-3)^2} = \sqrt{16+9} = \sqrt{25} = 5$

جمع طول های رأس های مقابل برابر است: $x + (-1) = 3 + (-1-x) \rightarrow x-1 = 2-x \rightarrow 2x = 3 \rightarrow x = \frac{3}{2}$

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$AC = BD \Rightarrow \sqrt{(\frac{3}{2}-(-1))^2 + (y-4)^2} = \sqrt{(\frac{3}{2}-3)^2 + (y+2)^2} \rightarrow \frac{25}{4} + y^2 - 8y + 16 = \frac{1}{4} + y^2 + 4y + 4$
 $\rightarrow 12y = 12 + \frac{25-1}{4} \rightarrow 12y = 12 + \frac{24}{4} \rightarrow y = 0$

$AD = \sqrt{(\frac{3}{2})^2 + 2^2} = \frac{5}{2} \Rightarrow 2(\frac{5}{2} + \frac{5}{2}) = 10$

$2mx + (m^2 + 1)y = 3 \rightarrow (m^2 + 1)y = -2mx + 3$

شیب خط: $-\frac{2m}{m^2+1}$ زاویه ۹۰ درجه با شیب مستقیم: $\text{شیب} = \tan 90^\circ \rightarrow -\frac{2m}{m^2+1} = \sqrt{3} \rightarrow -2m = \sqrt{3}m^2 + \sqrt{3}$
 $\rightarrow \sqrt{3}m^2 + 2m + \sqrt{3} = 0 \rightarrow m^2 + \frac{2}{\sqrt{3}}m + 1 = 0$

سوال ۳

افتداد: $\frac{\sqrt{\Delta}}{a} = \frac{\sqrt{\frac{4}{3} + 1}}{1} = \sqrt{\frac{7}{3}} = \frac{\sqrt{21}}{\sqrt{3}} = \frac{\sqrt{7}}{\sqrt{3}}$

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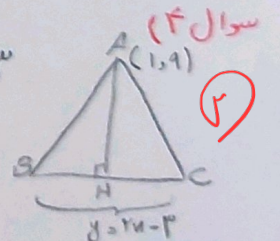
$A(1, 9) \quad B(3, 3) \quad C(5, 11) \quad AH = ?$

مقدار شیب BC: $m = \frac{11-3}{5-3} = \frac{8}{2} = 4$

$y-3 = 4(x-3) \rightarrow y-3 = 4x-12 \rightarrow y = 4x-9$

$AH = \text{فاصله نقطه A از خط BC} \rightarrow d = \frac{|ax+by+c|}{\sqrt{a^2+b^2}} = \frac{|4(1)+(-1)(9)-3|}{\sqrt{4^2+(-1)^2}} = \frac{|4-9-3|}{\sqrt{16+1}} = \frac{|-8|}{\sqrt{17}} = \frac{8}{\sqrt{17}}$

$= \frac{8\sqrt{17}}{17} \rightarrow AH = \frac{8\sqrt{17}}{17}$

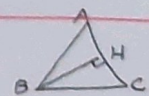


سوال ۴

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$AB: y+2x=7 \quad AC: 4y-3x=17$
 $y=-2x+7 \quad 4y=3x+17$

$BC: 2y-7x=-19 \quad BH=?$
 $2y=7x-19$



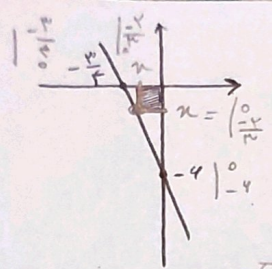
سوال ۵

$B \rightarrow AB, BC: 2(-2x+7)=7x-19 \rightarrow -4x+14=7x-19 \rightarrow 11x=33 \rightarrow x=3, y=-2(3)+7 \rightarrow y=1$
 $C \rightarrow BC, AC: 4(\frac{7}{4}x-\frac{19}{4})=3x+17 \rightarrow 7x-19=3x+17 \rightarrow 4x=36 \rightarrow x=9, y=1$
 $A \rightarrow AB, AC: 4(-2x+7)=3x+17 \rightarrow -8x+28=3x+17 \rightarrow 11x=11 \rightarrow x=1, y=5$

$A(1, 5), B(3, 1), C(9, 1)$

فاصله نقطه B از خط AC: $d = \frac{|(-3)(3)+4(1)-17|}{\sqrt{(-3)^2+4^2}} = \frac{|-9+4-17|}{\sqrt{9+16}} = \frac{|-22|}{\sqrt{25}} = \frac{22}{5} \Rightarrow BH = \frac{22}{5}$

سوال ۶) (۲)



$(0, -4) \quad (-\frac{3}{4}, 0)$
 شیب: $\frac{-4 - 0}{0 - (-\frac{3}{4})} = \frac{-4}{\frac{3}{4}} = -\frac{16}{3} = -\frac{4}{3}$
 $b = -4$
 $y = -\frac{4}{3}x - 4$
 تقاطع با محور x: $0 = -\frac{4}{3}x - 4 \rightarrow 4x = -12 \rightarrow x = -3$
 تقاطع با محور y: $x = 0 \rightarrow y = -4$
 طول: $\sqrt{(-3)^2 + (-4)^2} = \sqrt{9+16} = \sqrt{25} = 5$

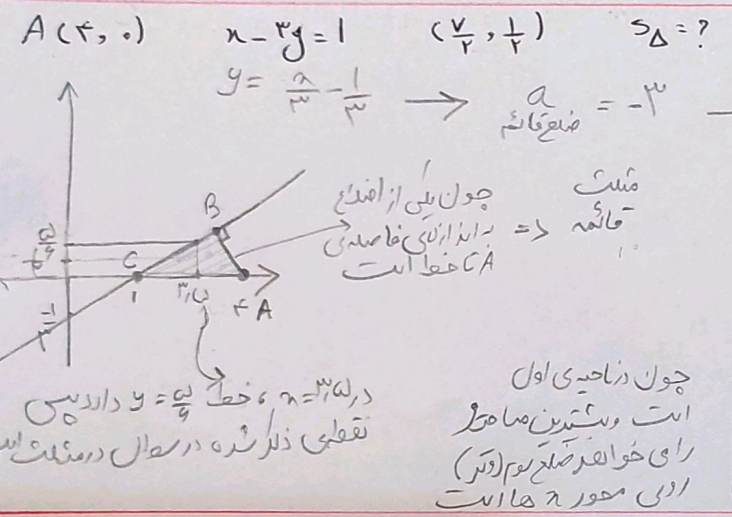
$\sqrt{25} = 5$
 $\Rightarrow \sqrt{25} = 5$

سوال ۱۷)

$1 - ax = 1, ay - x = a - 1$
 $ay - ax^2 - a = 0$
 $ay = x - (a-1) = 0$
 $a^2 = 1 \rightarrow a = \pm 1$
 $\frac{|C-C'|}{\sqrt{a^2+b^2}} = \frac{|a - (a-1)|}{\sqrt{a^2+1}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
 $\Rightarrow S = \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \frac{1}{2}$

$\Rightarrow S = \frac{1}{2}$

سوال ۱۸)



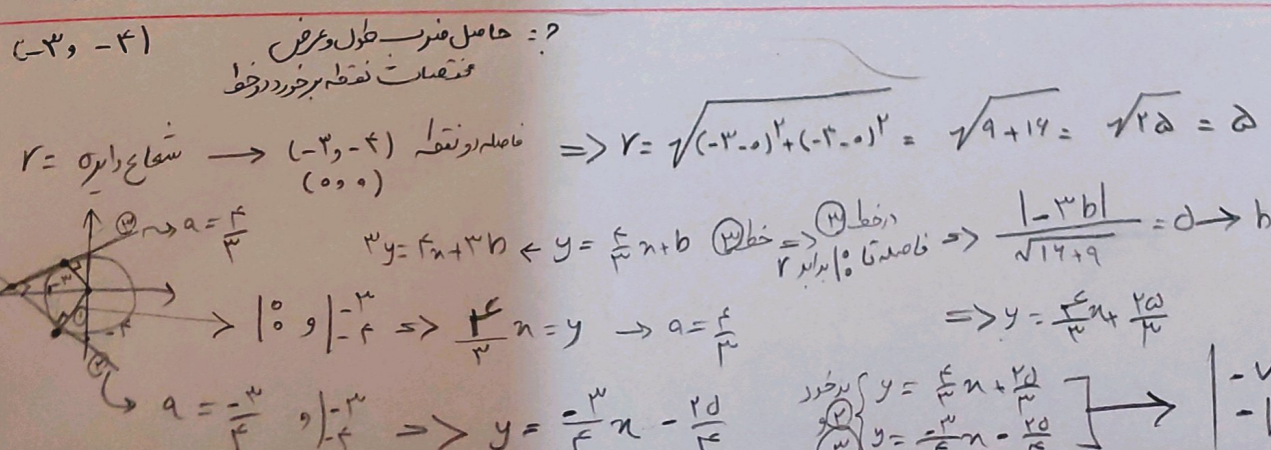
$A(4, 0) \quad x - 3y = 1 \quad (\frac{1}{3}, \frac{1}{3}) \quad S_{\Delta} = ?$
 $y = \frac{x}{3} - \frac{1}{3} \rightarrow a = -3$
 $-3x + b = y \rightarrow b = 1 \rightarrow -3x + 1 = y$
 $\begin{cases} -3x + 1 = y \\ \frac{x}{3} - \frac{1}{3} = y \end{cases} \rightarrow -3x + 1 = \frac{x}{3} - \frac{1}{3} \rightarrow 3x - 9x = x - 1 \rightarrow -6x = x - 1 \rightarrow -7x = -1 \rightarrow x = \frac{1}{7}$
 $\rightarrow y = 0.14 \Rightarrow B: (\frac{1}{7}, 0.14)$
 $\Rightarrow \frac{3 \times 0.14}{2} = 0.21$

سوال ۹)

$(-\frac{1}{3}, a), (-\frac{1}{3}, b) \quad m_{\Delta} = \sqrt{3}$
 $y = \sqrt{3}x + C$
 $a = (\sqrt{3} \times -\frac{1}{3}) + C \rightarrow a = -\frac{\sqrt{3}}{3} + C$
 $b = (\sqrt{3} \times -\frac{1}{3}) + C \rightarrow b = -\frac{\sqrt{3}}{3} + C$
 $\sqrt{(\frac{1}{3} + \frac{1}{3})^2 + (b-a)^2} = \sqrt{(\frac{2}{3})^2 + (-\frac{\sqrt{3}}{3} + C + \frac{\sqrt{3}}{3} - C)^2} = \sqrt{\frac{4}{9} + \frac{3}{9}} = \sqrt{\frac{7}{9}} = \frac{\sqrt{7}}{3}$

$\frac{1}{3} \rightarrow x^2 = (\frac{1}{3})^2 + (\frac{1}{3})^2 \Rightarrow x^2 = \frac{1}{9} + \frac{1}{9} \rightarrow x = \sqrt{\frac{2}{9}} = \frac{\sqrt{2}}{3}$

سوال ۱۱۰)



$r = 5$
 $\Rightarrow r = \sqrt{(-3-0)^2 + (-4-0)^2} = \sqrt{9+16} = \sqrt{25} = 5$
 $y = 3x + 20$
 $\Rightarrow y = \frac{3}{4}x + \frac{20}{4}$
 $\Rightarrow y = \frac{3}{4}x + 5$