

$$m = \frac{-4-1}{4-2} = -\frac{5}{2} \quad \textcircled{1} \quad \left(\frac{2+4}{2}, \frac{-4+1}{2} \right) = (3, 1) \quad \textcircled{2}$$

$$\textcircled{1} \textcircled{2} \rightarrow y-1 = -\frac{5}{2}(x-2) \rightarrow \underline{y = -\frac{5}{2}x + 22}$$

$$BC \rightarrow \sqrt{(7-3)^2 + (-4+1)^2} = 5 \quad \textcircled{1} \quad m_{BC} = \frac{7-3}{-4+1} = -\frac{4}{3}$$

$$\Rightarrow BC \Rightarrow y-3 = -\frac{4}{3}(x+1) \Rightarrow y = -\frac{4}{3}x + \frac{5}{3} \Rightarrow 3y + 4x - 5 = 0$$

$$AH \rightarrow \frac{3(1)+4(3)-5}{\sqrt{9+16}} = \frac{10}{5} = 2 \quad \textcircled{2}$$

$$\textcircled{1} \textcircled{2} \rightarrow BC - AH = 5 - 2 = \underline{3}$$

$$\Rightarrow \frac{r}{p} = \frac{a}{-(-1)} \Rightarrow a = 2, \quad 2r = \frac{|c-c'|}{\sqrt{r_0}} \Rightarrow 2r = \frac{|14-2|}{\sqrt{20}}$$

$$\Rightarrow r = \frac{4}{\sqrt{20}} = \frac{2}{\sqrt{5}}$$

$$S = \pi r^2 = \pi \left(\frac{2}{\sqrt{5}} \right)^2 = \underline{\frac{4}{5} \pi}$$

$$m_{AB} = \frac{3-1}{2-4} = -1 \Rightarrow y-3 = -(x-2) \Rightarrow y+x=5$$

$$m_{CH} = -\frac{1}{-1} = 1 \Rightarrow y+3 = (x+1) \Rightarrow y-x = -2 \quad \left. \begin{array}{l} y+x=5 \\ y-x=-2 \end{array} \right\} \Rightarrow 2y=3$$

$$\Rightarrow y = \frac{3}{2}, x = \frac{7}{2} \quad \textcircled{1} \quad M = \left(\frac{4+2}{2}, \frac{3+1}{2} \right) = (3, 2) \quad \textcircled{2}$$

$$\textcircled{1} \textcircled{2} \rightarrow \sqrt{\left(3-\frac{7}{2}\right)^2 + \left(2-\frac{3}{2}\right)^2} = \sqrt{\frac{1}{4} + \frac{1}{4}} = \underline{\frac{\sqrt{2}}{2}}$$

$$m \times m' = -1 \Rightarrow \left(-\frac{3m-2}{5-m} \right) \left(-\frac{m+1}{-(2m+4)} \right) = -1$$

$$(3m-2)(m+1) - (5-m)(2m+4) = 0$$

$$\Rightarrow 5m^2 - 13m + 18 = 0 \rightarrow \Delta < 0$$

هیچ مقدار حقیقی برای m وجود ندارد.

$A \rightarrow x + 2(2x - 1) = 3 \Rightarrow 5x = 5 \Rightarrow x = 1, y = 1$ $B \rightarrow x + 2(1 - x) = 3 \Rightarrow -x = -5 \Rightarrow x = 5, y = -1$ $C \rightarrow x + 2x - 1 = 4 \Rightarrow 3x = 5 \Rightarrow x = \frac{5}{3}, y = \frac{4}{3}$ $AM \rightarrow \sqrt{\left(\frac{1}{2} - 1\right)^2 + \left(\frac{1}{2} - 1\right)^2} = \sqrt{\frac{2}{4}} = \frac{\sqrt{2}}{2} \quad (1)$ $BC \rightarrow m_{BC} = \frac{\frac{4}{3} - (-1)}{\frac{5}{3} - 5} = -1 \Rightarrow y + 1 = -(x - 5) \Rightarrow y + x - 4 = 0$ $AH \rightarrow \frac{1(1) + 1(1) - 4}{\sqrt{1+1}} = \frac{2}{\sqrt{2}} = \sqrt{2} \quad (2) \quad \frac{2 \cdot \sqrt{2}}{\sqrt{2}} = \frac{4}{2} = 2$	6
$m = -\frac{1}{2} \Rightarrow y = -\frac{1}{2}x + b \Rightarrow A = (0, b), B = (2b, 0)$ $AB \Rightarrow AB = \sqrt{(2b-0)^2 + (0-b)^2} = \sqrt{5b^2} = b \sqrt{5} \quad (1)$ $x + 2y - 2b = 0 \Rightarrow \frac{ 0+0-2b }{\sqrt{1+4}} = \frac{2 b }{\sqrt{5}} = 2\sqrt{5} \Rightarrow \underline{b = 5} \quad (2)$ $(1) \Rightarrow \underline{5\sqrt{5}}$	7
$خط اول \rightarrow y = \frac{k}{m}x + 2 \quad خط دوم \rightarrow y = (1-m)x + 2$ $\Rightarrow \frac{k}{m}x + 2 = (1-m)x + 2 \Rightarrow \frac{k}{m}x = (1-m)x \Rightarrow x = 0, y = 2 \quad (1)$ $خط اول \rightarrow 0 = \frac{k}{m}x + 2 \Rightarrow x_1 = -\frac{m}{k} \quad (2) \quad 0 = (1-m)x + 2 \Rightarrow x_2 = \frac{-2}{1-m} \quad (3)$ $(1) \Rightarrow S = \frac{1}{2} x_1 - x_2 \times 2 = \frac{1}{2} \Rightarrow \left -\frac{m}{k} + \frac{2}{1-m} \right = \frac{1}{2}$ $\Rightarrow 2(1-m) \left(-\frac{m}{k} + \frac{2}{1-m} \right) = 2(1-m) \times \frac{1}{2} \Rightarrow m^2 + km - 1 = 0 \Rightarrow m = \frac{-k \pm \sqrt{k^2 + 4}}{2}$ $\Rightarrow m^2 - m + 2 = -5 + 5m \Rightarrow (m-3)^2 = 0 \Rightarrow m = 3 \Rightarrow (-2 + \sqrt{5})(-2 - \sqrt{5})^3 = \underline{-3}$	8
$x = 0 \rightarrow y = -3, x = 1 \rightarrow y = -1$ $\left. \begin{aligned} (0, -3) &\rightarrow (2 \times 2 - 0, 2 \times (-3) + 3) = (4, -3) \\ (1, -1) &\rightarrow (2 \times 2 - 1, 2 \times (-1) + 3) = (3, -1) \end{aligned} \right\} m = \frac{-3 - (-1)}{3 - 4} = 2$ $\Rightarrow y - 3 = 2(x + 3) \Rightarrow \underline{y = 2x + 9}$	9
$y = x + 5 \rightarrow m = 1 \Rightarrow m' = -1 \Rightarrow y - 5 = -(x - 1) \Rightarrow y = -x + 6$ $\Rightarrow -x + 6 = x + 5 \Rightarrow 2x = 1 \Rightarrow x = \frac{1}{2}, y = \frac{11}{2}$ $\Rightarrow 2b - a = 2 \times \frac{11}{2} + 3 = \underline{15}$	10