①

A ——— M ——— B

$A\,|\,۲ , ۸$ $\quad M\,|\,۳ , ۱$ $\quad B\,|\,۴ , −۶$

$m_x = \frac{۴+۲}{۲} = ۳$

$m_y = \frac{۸−۶}{۲} = +۱$

$a = \frac{y_A − y_B}{x_A − x_B} = \frac{۸+۶}{۲−۴} = \frac{۱۴}{−۲} = −۷ \rightarrow m = −۷ \rightarrow y_{AB} = −۷x + ۲۲$

$m' = \frac{۱}{۷}$

عمود منصف $y = \frac{۱}{۷}x + h$

$M\,|\,۳ , ۱ \longrightarrow ۱ = \frac{۳}{۷} + h \longrightarrow h = \frac{۴}{۷} \longrightarrow \boxed{y = \frac{۱}{۷}x + \frac{۴}{۷}}$

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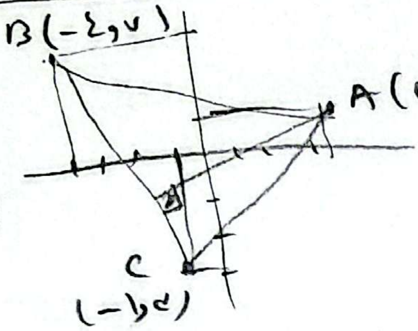
②



شیب BC $\quad m = \frac{−۱−۷}{۳+۴} = \frac{−۸}{۷}$

$y = −\frac{۸}{۷}x + h \rightarrow y + \frac{۸}{۷}x − \frac{۱۲}{۷} = ۰$

$x = −۱ \quad h = \frac{۱۲}{۷}$

$AH = \frac{۷ + \frac{۲۴}{۷} − \frac{۱۲}{۷}}{\sqrt{۱ + \frac{۶۴}{۴۹}}} = \frac{۷(۱ + \frac{۱۱}{۷})}{\sqrt{۴۹+۶۴}} = \frac{۱۸}{\sqrt{۴۹+۶۴}}$

$\overline{BC} = \sqrt{(۳+۴)^۲ + (۱+۷)^۲} = \sqrt{۴۹+۶۴}$

$BC − AH = \sqrt{۴۹+۶۴} − \frac{۱۸}{\sqrt{۴۹+۶۴}} = \frac{۹۵}{\sqrt{۱۱۳}}$

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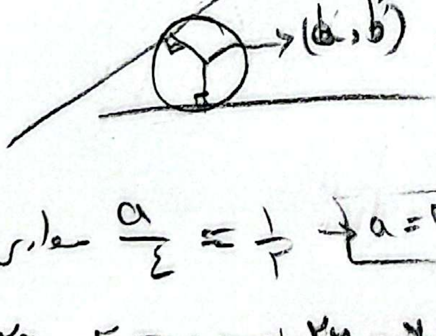
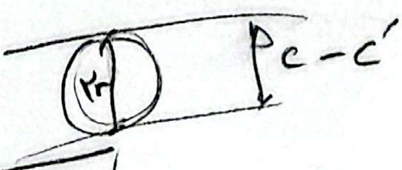
③



$\rightarrow (a , b') \longrightarrow \frac{\quad}{\sqrt{۴+۱}} = \frac{\quad}{\sqrt{۱۶+۱}}$

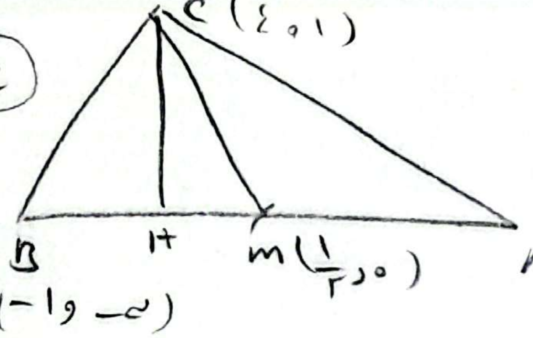
حال $\frac{a}{۴} = \frac{۱}{۲} \rightarrow \boxed{a = ۲}$

$۴y − ۲x − ۲ = ۰ \longrightarrow \begin{cases} ۲y − x − ۱ = ۰ \\ ۲y − x − ۷ = ۰ \end{cases}$



$c − c' = −۱ + ۷ = ۶ \longrightarrow ۲r = ۶ \longrightarrow \boxed{r = ۳}$

(۴)

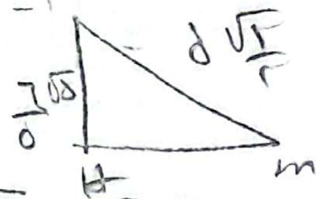


$m \left| \begin{matrix} \frac{1}{2} \\ 0 \end{matrix} \right.$ $\quad m_{AB} = \frac{3+3}{2+1} = 2$

$y = 2x + h \to y = 2x - 1$

$AB: y - 2x + 1 = 0 \to CH = \frac{|1 - 8 + 1|}{\sqrt{5}} = \frac{6}{\sqrt{5}}$

$Cm: \sqrt{\left(4 - \frac{1}{2}\right)^2 + 1} = \frac{5\sqrt{2}}{2}$



$\sqrt{\frac{25}{2} - \frac{36}{5}} = \sqrt{\frac{48}{10}} = \sqrt{\frac{24}{5}}$

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(۵)

$m' = \frac{3m - 2}{m - 5}$

$m = \frac{m+1}{2m-4} \to m m' = -1$

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

$3m^2 + m - 2 = -2m^2 + 14m - 20$

$5m^2 - 13m + 18 = 0$

$\Delta < 0 \to$ هیچ مقدار m

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(۶) $AB \perp AC \to \angle A = 90^\circ$ $\quad A \left| \begin{matrix} 1 \\ 1 \end{matrix} \right. \quad B \left| \begin{matrix} 6 \\ -1 \end{matrix} \right. \quad C \left| \begin{matrix} \frac{5}{3} \\ \frac{7}{3} \end{matrix} \right.$

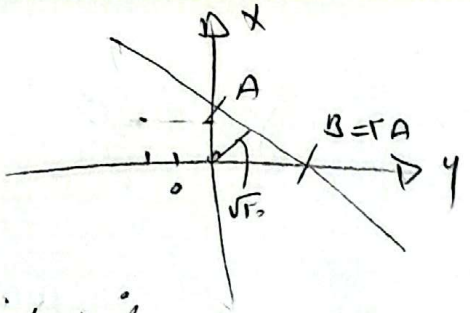
$Am = \sqrt{\left(\frac{7}{3}\right)^2 + \left(\frac{1}{3}\right)^2} = \frac{\sqrt{50}}{3} = \frac{5\sqrt{2}}{3}$ $\quad m \left| \begin{matrix} \frac{10}{3} \\ \frac{2}{3} \end{matrix} \right.$

$AH = \frac{|1 + 1 - 4|}{\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$

$Am = \frac{5\sqrt{2}}{3}, \; AH = \sqrt{2}$

$\frac{Am}{AH} = \frac{5}{3}$

(۷)



$S_{OAB} = \sqrt{A^2+B^2}$

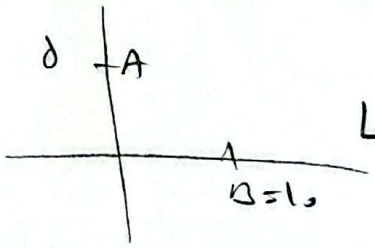
$y = -\frac{1}{2}x + h$

$B \to h = \frac{B}{2} \to \boxed{2A = B}$

$A \to h = A$

$$\frac{y + \frac{1}{2}x + A}{\sqrt{1+\frac{1}{4}}} = \sqrt{20}$$

$$A = \sqrt{8 \times 5} \times \frac{\sqrt{5}}{2} = 5 \to \begin{matrix} A = 5 \\ B = 10 \end{matrix}$$



$$L = \sqrt{10^2 + 5^2} = \sqrt{125} = 5\sqrt{5}$$

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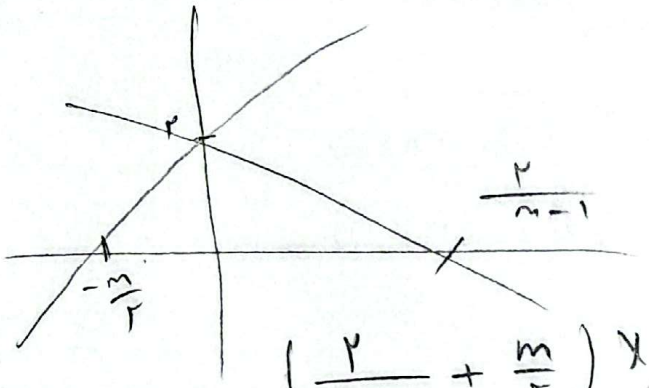
(۸)



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

$$2(2 + m^2 - m) = 5(m-1)$$

$$2m^2 - 7m + 9 = 0$$

$$\boxed{\frac{c}{a} = 9}$$

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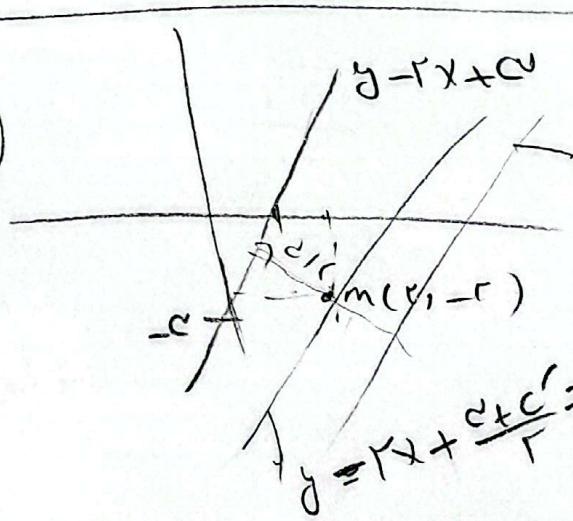
(۹)



$$y - 2x + \frac{c+c'}{2} = 0$$

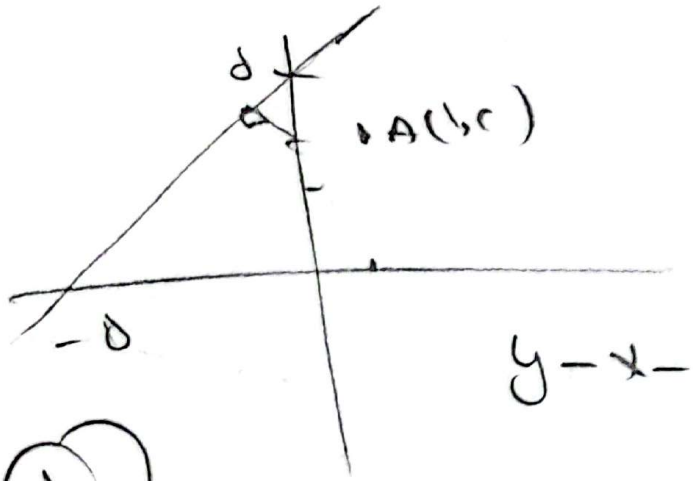
$$m \begin{matrix} 2 \\ -2 \end{matrix} \to 4 + 4 = -\frac{c+c'}{2}$$

$$8 = -c - c'$$

$$c' = -15$$

$$y = 2x + \frac{1}{2}(c+c') = 0$$

$$\boxed{y = 2x - 14 = 0}$$



$$y - x - 1 = 0 \qquad \frac{|2-1-1|}{\sqrt{2}} = \frac{b-a-1}{\sqrt{2}}$$

1.

$$+2 = b - a - 1 \rightarrow \boxed{b - a = 3}$$
$$b - a = 1$$
$$-2 = b - a - 1$$

$$y = -x + h \rightarrow \boxed{y = -x + 2}$$
$$\boxed{b = -a + 2}$$

$$\begin{array}{l} b - a = 3 \\ b + a = 2 \end{array} \rightarrow \boxed{\begin{array}{l} b = 2 \\ a = -1 \end{array}} \rightarrow \boxed{2b - a = 5}$$

$$\begin{array}{l} b - a = 1 \\ b + a = 4 \end{array} \rightarrow \begin{array}{l} a = 1 \\ b = 2 \end{array}$$ (3)