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کلیف ۱۴
۲۰ عالی نوشتن!

۱) $AB: y = -\sqrt{3}x + 2\sqrt{3} \rightarrow d: y = \frac{1}{\sqrt{3}}x + b \xrightarrow{m \perp} 1 \cdot \frac{\sqrt{3}}{\sqrt{3}} + b \rightarrow b = \frac{\sqrt{3}}{\sqrt{3}}$ (۲)

$d: y = \frac{1}{\sqrt{3}}x + \frac{\sqrt{3}}{\sqrt{3}} \checkmark \quad m \mid \frac{y_A + y_B}{x_A + x_B}$

۲) $BC = \sqrt{9+16} = 5 \checkmark \quad BC: y = -\frac{4}{3}x + \frac{17}{3} \rightarrow 3y - 4x - 5 = 0 \rightarrow 3y + 4x + 5 = 0$

$AH = \frac{|3+17-5|}{\sqrt{25}} = \frac{15}{5} = 3 \checkmark \quad BC - AH = 5 - 3 = 2 \checkmark$ (۲)

۳) $\begin{cases} 3y - 4x = 5 \\ 3y - 4x = 17 \end{cases} \xrightarrow{\frac{4}{3} = \frac{a}{b}} \begin{cases} 3y - 4x = 5 \\ 3y - 4x = 17 \end{cases} \rightarrow \begin{cases} 3y - 4x = 5 \\ 3y - 4x = 17 \end{cases}$ (۲)

$r = \frac{|17-5|}{\sqrt{16+9}} = \frac{12}{5} \rightarrow r = \frac{4}{5} = \frac{r}{\sqrt{5}} \rightarrow 5\pi r = \frac{4}{5}\pi \checkmark$

۴) $MH = \frac{|AC - BC|}{AB}$
 $\left. \begin{aligned} AC &= 3\sqrt{5} \\ BC &= \sqrt{20+16} = \sqrt{36} = 6 \\ AB &= \sqrt{9+16} = 5 \end{aligned} \right\} \Rightarrow MH = \frac{|3\sqrt{5} - 6|}{5\sqrt{5}} = \frac{6}{5\sqrt{5}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5} \checkmark$ (۲)

۵) $y = \frac{(m+1)}{m-1}x + \frac{1}{m-1} \leftrightarrow (m+1)x - y(m-1) + 1 = 0$

$y = \frac{(m-1)}{m-1}x - \frac{1}{m-1} \leftrightarrow x(m-1) + y(m-1) - 1 = 0$

$f_1 \times f_2 = -1 \rightarrow \frac{m+1}{m-1} \times \frac{m-1}{m-1} = -1$

$\rightarrow -m^2 + 1 = m^2 - 1 \rightarrow 2m^2 = 2 \rightarrow m^2 = 1 \rightarrow m = \pm 1$
 $\rightarrow \Delta < 0 \checkmark$ هیچ عددی

۶) $AB: AC \rightarrow A(1,1)$
 $\begin{aligned} 2m + 3y &= 4 \\ 2m - y &= 1 \end{aligned} \xrightarrow{5y=3} y = \frac{3}{5} \rightarrow m = \frac{1}{5}$

$AB: BC \rightarrow B(4,1)$
 $\begin{aligned} 2x + 3y &= 17 \\ 2x + y &= 1 \end{aligned} \xrightarrow{2y=16} y = 8 \rightarrow x = -\frac{23}{2}$

$AC: DC$
 $\begin{aligned} 2m - y &= 1 \\ m + y &= 2 \end{aligned} \xrightarrow{3m=3} m = 1 \rightarrow y = \frac{1}{3}$

$C(\frac{d}{2}, \frac{h}{2})$
 $AM = \sqrt{(\frac{1}{5}-4)^2 + (\frac{3}{5}-1)^2} = \frac{\sqrt{100}}{5} = \frac{10}{5} = 2$
 $AH = \frac{|1+1-4|}{\sqrt{1+1}} = \frac{2}{\sqrt{2}} = \sqrt{2}$
 $\Rightarrow \frac{AM}{AH} = \frac{2}{\sqrt{2}} = \sqrt{2} \checkmark$ (۲)

$$v) \begin{cases} d: y = -\frac{1}{r}x + b \\ \text{نقطه مبدأ مختصات} \end{cases} \rightarrow \frac{|b|}{\frac{\sqrt{a}}{r}} \geq d \rightarrow |b| \geq d \rightarrow b \geq \pm d$$

(۲)

$$\begin{aligned} A(\alpha, 0) &\xrightarrow{d} 0 = -\frac{\alpha}{r} + b \rightarrow \alpha = rb \\ B(0, \beta) &\xrightarrow{d} \beta = 0 + b \rightarrow \beta = b \end{aligned}$$

$$\begin{aligned} AB &= \sqrt{\alpha^2 + \beta^2} = \sqrt{0 + b^2} = \sqrt{a} |b| \\ &\rightarrow AB = d \sqrt{a} \checkmark \end{aligned}$$

$$\begin{aligned} 1) \begin{cases} d_1: y = x(1-m) + r \xrightarrow{y=0} x = \frac{r}{m-1} \\ d_2: y = x \frac{r}{m} + r \xrightarrow{y=0} x = -\frac{m}{r} \end{cases} \end{aligned}$$

$$\begin{aligned} d_1 \perp d_2 &\rightarrow (1-m - \frac{r}{m}) \cdot \frac{r}{m} = 0 \rightarrow 1-m - \frac{r}{m} = 0 \rightarrow y = r \\ &\rightarrow 1-m \neq \frac{r}{m} \text{ شرط منطبق } \checkmark \\ &\rightarrow r - m + m \frac{r}{m} \neq 0 \rightarrow d < 0 \end{aligned}$$

(۲)

$$\begin{aligned} \Rightarrow \frac{\frac{r}{m-1} \times \frac{m}{r}}{r} \geq \frac{d}{r} &\rightarrow \frac{|m^2 - m + r|}{r(m-1)} \geq \frac{d}{r} \rightarrow \begin{cases} m^2 - 4m + 4 \geq 0 \rightarrow m \geq 2 \\ m^2 - m + r = -4m + 4 \\ \rightarrow m^2 + 3m - 1 \geq 0 \end{cases} \\ &\rightarrow -1 \times 3 = -3 \checkmark \end{aligned}$$

$$a) \begin{cases} d: y = 2x - 3 \\ \text{نقطه } A(0, -3) \end{cases}$$

$$\begin{aligned} A' &= (a, b) \\ m_d &= 2, m_{d'} \end{aligned}$$

$$A' \begin{bmatrix} r_{m_d} - m_{d'} \\ r_{y_{m_d}} - y_{d'} \end{bmatrix} = \begin{bmatrix} r \\ -1 \end{bmatrix}$$

$$\begin{aligned} d': y &= 2x + b \\ &\rightarrow -1 = 2a + b \\ &\rightarrow b = -4 \\ &\rightarrow d': y = 2x - 4 \checkmark \end{aligned}$$

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$$10) \begin{cases} AH: y = -x + b \xrightarrow{A} r = -1 + b \rightarrow b = r \\ d: y = x + a \end{cases}$$

$$\begin{aligned} \text{نقطه } H &\rightarrow -x + r = x + a \rightarrow x = \frac{r-a}{2} \\ &\rightarrow y = \frac{r+a}{2} \end{aligned}$$

(۲)

$$\begin{aligned} A' \begin{bmatrix} r_{m_H} - m_A \\ r_{y_A} - y_A \end{bmatrix} &= \begin{bmatrix} -r \\ 4 \end{bmatrix} \\ A'(a, b) &\rightarrow \begin{cases} a = -r \\ b = 4 \end{cases} \rightarrow b - a = 12 - (-3) = 15 \checkmark \end{aligned}$$