

14 سوال

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اصول مهندسی

1. $B(2, 1) \quad A(4, -4)$ $y - 1 = \frac{1}{3}(x - 2)$

نقطه $g \rightarrow g\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = (2, 1)$

$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-4)}{2 - 4} = \frac{5}{-2} = -\frac{5}{2}$ $m' = \frac{1}{5}$

$y = \frac{1}{5}x + \frac{4}{5}$

2. $A(3, 1) \quad B(-2, 5) \quad C(-1, 2)$ $\frac{BC}{AH} = ?$

$BC = \sqrt{(-1 + 2)^2 + (2 - 5)^2} = \sqrt{10} = \sqrt{2} \cdot \sqrt{5}$

$BC \perp AH \rightarrow BC \text{ خط } y = -\frac{2}{5}x + \frac{14}{5} \rightarrow A: BC = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$

$\hookrightarrow AH = 2 \quad BC - AH = \sqrt{2} - 2 = \sqrt{2} - 2$

3. $fy = ax + r, \quad ry - x = v \quad S_0 = ?$

$\hookrightarrow y = \frac{a}{r}x + \frac{1}{r} \quad \hookrightarrow y = \frac{1}{r}x + \frac{v}{r}$

$\frac{a}{r} = \frac{1}{r} \rightarrow a = 1$ $d = \frac{|C_2 - C_1|}{\sqrt{a^2 + b^2}} = \frac{|\frac{v}{r} - \frac{1}{r}|}{\sqrt{1 + \frac{1}{r^2}}} = \frac{\frac{v-1}{r}}{\frac{\sqrt{r^2 + 1}}{r}} = \frac{v-1}{\sqrt{r^2 + 1}}$

$r = \frac{3}{\sqrt{5}} \rightarrow S = \pi r^2 = \pi \left(\frac{3}{\sqrt{5}}\right)^2 = \frac{9\pi}{5}$

4. $A(3, 2) \quad B(4, 1) \quad C(-1, -2)$

$M \rightarrow \text{نقطه} \quad H \rightarrow \text{ارتفاع} \quad MH = ?$

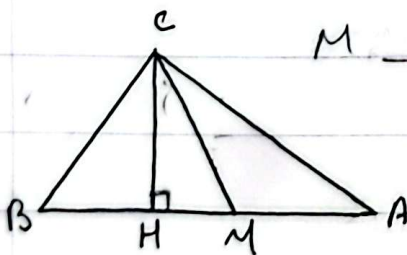
$M \rightarrow \begin{cases} \frac{3+4}{2} = 3.5 \\ \frac{2+1}{2} = 1.5 \end{cases}$ $CM = \sqrt{(3.5 - (-1))^2 + (1.5 - (-2))^2} = \sqrt{41}$

$AB \rightarrow m = \frac{1-2}{4-3} = -1 \rightarrow y = -x + 7$

$AB: C \text{ خط } = \frac{|y + x - 7|}{\sqrt{2}} = \frac{|-1 + 3 - 7|}{\sqrt{2}} = \frac{5}{\sqrt{2}}$

$\hookrightarrow MH^2 + CH^2 = CM^2 \rightarrow MH^2 + \frac{25}{2} = 41$

$\hookrightarrow MH^2 = \frac{57}{2} \rightarrow MH = \frac{\sqrt{114}}{2}$



$$(3m-2)x + (2-m)y - 7 = 0 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{معمولاً } m=5 \quad .5$$

$$(m+1)x + (2m-5)y + 1 = 0 \rightarrow y = \frac{-(m+1)}{-(2m-5)} x = \frac{1}{-(2m-5)}$$

$$(2-m)y = -(3m-2)x + 7 \rightarrow y = \frac{-(3m-2)}{(2-m)} x + \frac{7}{(2-m)}$$

$$m_1 \times m_2 = -1 \rightarrow (3m-2)(m+1) = (2-m)(2m-5) \rightarrow 2m^2 - 13m + 12 = 0$$

$\Delta < 0 \rightarrow$ اشتباه است! $\rightarrow$ برای معادله مقدار m برقرار نیست!

$$AB: x+2y=3, AC: y=2x-1, BC: x+y=5 \quad AH = \frac{1+1+1}{\sqrt{5}} = \sqrt{3} \quad .6$$

$$AM \rightarrow \text{میدان} \quad AH \rightarrow \text{ارتفاع} \rightarrow \frac{AM}{AH} = \frac{1}{2} \quad A = 2x-1 = \frac{3}{2} - \frac{1}{2}x \rightarrow \frac{3}{2}x = \frac{5}{2} \rightarrow x=1, y=1$$

$$B = \frac{3}{2} - \frac{1}{2}x = 5 - x \rightarrow \frac{1}{2}x = \frac{7}{2} \rightarrow x=7, y=-1 \quad C = 5 - x = 2x-1 \rightarrow 3x=6 \rightarrow x=2, y=\frac{3}{2}$$

$$AM = \sqrt{\frac{49}{4} + \frac{1}{4}} = \frac{\sqrt{50}}{2} \rightarrow m_{BC} = 1 \rightarrow y = x - 4 \rightarrow 1 = x - 4 \rightarrow x = 5, y = -3$$

$$m_{AH} = -1 \rightarrow y = -x + 2 \rightarrow \frac{AM}{AH} = \frac{\frac{\sqrt{50}}{2}}{\frac{\sqrt{5}}{2}} = \frac{\sqrt{10}}{1} = \sqrt{10}$$

$$m = -\frac{1}{2} \quad Od = \sqrt{20} \quad AB = 8$$

$$y = -\frac{1}{2}x + c \xrightarrow{\text{نقطه } O} x=0 \rightarrow y=c \rightarrow (0, c)$$

$$x=0 \rightarrow x=2c \rightarrow (2c, 0)$$

$$d = \frac{|0+0-2c|}{\sqrt{5}} = \sqrt{20} \rightarrow |2c| = \sqrt{20} = 2\sqrt{5} \rightarrow 2c = \pm 2\sqrt{5} \rightarrow c = \pm \sqrt{5} \rightarrow AB = \sqrt{(1-0)^2 + (0-2)^2} = \sqrt{5}$$

$$\rightarrow (-3) \text{ ضرب } 3, -2+\sqrt{5}, -2-\sqrt{5}$$

$$my - 5x = 2m, y + mx = x + 2 \rightarrow S_{\Delta} = \frac{d}{r} = S = \frac{1}{2} \left| m + \frac{5}{m-1} \right| \quad .8$$

$$y = \frac{5}{m}x + 2 \rightarrow y = (1-m)x + 2 \rightarrow y=0 \quad \left. \begin{array}{l} A(0,2) \\ B(-\frac{m}{1-m}, 0) \\ C(-\frac{5}{m(1-m)}, 0) \end{array} \right\}$$

$$y = 2x - 3 \quad \text{نسبت } M(2, -2)$$

$$2 = \frac{2+x_{B'}}{2} \rightarrow x_{B'} = 2$$

$$-3 = \frac{0+y_{B'}}{2} \rightarrow y_{B'} = -6$$

$$\left. \begin{array}{l} \\ \\ \end{array} \right\} d' = y = 2x - 1$$

$$\frac{\alpha+0}{2} = 2 \rightarrow \alpha = 4$$

$$\rightarrow A(4, -1)$$

$$M_d = 2 \rightarrow M_{d'} = 2 \rightarrow y = 2x - 1$$

$$\frac{\beta-3}{2} = -2 \rightarrow \beta = 1$$

$$A(1,5) \quad y = n + d \rightarrow A'(a, b) \quad r b - a = ?$$

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$$m = -1 \rightarrow y - r = -(n - 1) \rightarrow y = -n + r$$

$$M = -n + r = n + d \rightarrow rn = -r \rightarrow n = -1 \rightarrow y = \varepsilon \rightarrow M$$

$$\left| \begin{array}{l} \frac{1+a}{r} = -1 \rightarrow a = -r \\ \frac{r+b}{r} = \varepsilon \rightarrow b = 4 \end{array} \right.$$

$$r b - a = 10 + r = 10$$