

$$m_{AB} = \frac{y_B - y_A}{x_B - x_A} = \frac{1 - (-4)}{2 - 1} = \frac{-12}{1} = -12 \Rightarrow m = \frac{1}{12}$$

-1

$$M \begin{cases} \frac{x_A + x_B}{2} = \frac{2 + 1}{2} = 1.5 \\ \frac{y_A + y_B}{2} = \frac{1 - 4}{2} = -1.5 \end{cases}$$

$$y - y_m = m(x - x_m)$$

$$\Rightarrow y - 1 = \frac{1}{12}(x - 1.5) \Rightarrow \boxed{y = \frac{1}{12}x + \frac{11}{8}}$$

AH = BC (میان خط)

$$m_{BC} = \frac{y_C - y_B}{x_C - x_B} = \frac{1 - 1}{-1 - (-1)} = \frac{0}{0}$$

-2

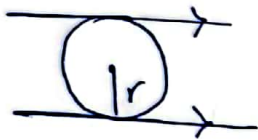
$$y - y_B = m(x - x_B) \Rightarrow y - 1 = \frac{-1}{1}(x + 1) \Rightarrow y = -x - 1$$

$$\xrightarrow{x=1} 1y + 1x - 1 = 0$$

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

$$BC = \sqrt{(x_C - x_B)^2 + (y_C - y_B)^2} = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$BC - AH = \sqrt{2} - \frac{1}{\sqrt{2}} = \frac{2 - 1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$



محل برخورد = مرکز دایره

$$(1y - x - 1 = 0) \times 1 \Rightarrow 1y - x - 1 = 0$$

-3

$$r = \frac{|c' - c|}{\sqrt{a^2 + b^2}} = \frac{|1 - 1 - (-1)|}{\sqrt{1^2 + 1^2}} = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$$\Rightarrow r = \frac{1}{\sqrt{2}}$$

$$S = \pi r^2 = \pi \times \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{\pi}{2}$$

$$M \begin{cases} \frac{x_A + x_B}{2} = \frac{2 + 1}{2} = 1.5 \\ \frac{y_A + y_B}{2} = \frac{1 + 1}{2} = 1 \end{cases}$$

$$m_{AB} = \frac{y_B - y_A}{x_B - x_A} = \frac{1 - 1}{1 - 2} = \frac{0}{-1} = 0$$

-4

$$\Rightarrow m_{CH} = 1 \quad CH: y - y_C = m(x - x_C) \Rightarrow y - 1 = x - 1 \Rightarrow y = x$$

$$AB: y - y_A = m(x - x_A)$$

$$y - 1 = -1(x - 2) \Rightarrow y = -x + 3$$

$$x - 1 = -x + 3 \Rightarrow 2x = 4 \Rightarrow x = 2$$

$$\Rightarrow x = \frac{4}{2} = 2, y = \frac{4}{2} = 2$$

نقطه برخورد AB و CH

$$H\left(\frac{4}{2}, \frac{4}{2}\right), M(1.5, 1)$$

$$MH = \sqrt{\left(\frac{4}{2} - 1.5\right)^2 + \left(\frac{4}{2} - 1\right)^2} = \sqrt{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2} = \frac{\sqrt{2}}{2}$$

$$(3m-2)x + (5-m)y - 7 = 0 \leadsto m_1 = \frac{-(3m-2)}{5-m} = \frac{3m-2}{m-5}$$

$$(m+1)x - (2m-4)y + 1 = 0 \leadsto m_2 = \frac{-(m+1)}{-(2m-4)} = \frac{m+1}{2m-4}$$

دو خط برهم‌گسسته $\Rightarrow m_1 \times m_2 = -1 \Rightarrow \frac{3m-2}{m-5} \times \frac{m+1}{2m-4} = -1$

$$\Rightarrow \frac{3m-2}{m-5} = \frac{-2m+2}{m+1} \Rightarrow 3m^2 - 2m + 3m - 2 = -2m^2 + 4m + 10m - 20$$

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

لذا این دو خط نمی‌توانند برهم‌گسسته

$$\begin{cases} AB: x+2y=3 \Rightarrow y = -\frac{1}{2}x + \frac{3}{2} \\ AC: y=2x-1 \\ BC: x+y=5 \Rightarrow y = -x+5 \end{cases} \quad \begin{cases} A(1,1) \\ B(5,-1) \\ C(\frac{5}{3}, \frac{1}{3}) \end{cases}$$

$$\Rightarrow -\frac{1}{2}x_A + \frac{3}{2} = 2x_A - 1 \Rightarrow \frac{5}{2}x_A = \frac{5}{2} \Rightarrow x_A = 1, y_A = 1$$

$$\Rightarrow -x_B + 5 = -\frac{1}{2}x_B + \frac{3}{2} \Rightarrow \frac{1}{2}x_B = \frac{5}{2} \Rightarrow x_B = 5, y_B = -1$$

$$\Rightarrow 2x_C - 1 = -x_C + 5 \Rightarrow 3x_C = 6 \Rightarrow x_C = \frac{6}{3}, y_C = \frac{1}{3}$$

$$M \left| \begin{array}{l} \frac{x_B + x_C}{2} = \frac{5 + \frac{6}{3}}{2} = \frac{10}{2} = \frac{10}{2} \\ \frac{y_B + y_C}{2} = \frac{-1 + \frac{1}{3}}{2} = \frac{-\frac{2}{3}}{2} = -\frac{1}{3} \end{array} \right.$$

$$AM = \sqrt{(x_A - x_M)^2 + (y_A - y_M)^2}$$

$$= \sqrt{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{3}\right)^2} = \sqrt{\frac{13}{36}} = \frac{\sqrt{13}}{6}$$

AH: مساحت مثلث
در نقطه A

$$\leadsto AH = \frac{|1+1-5|}{\sqrt{2}} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$$

$$\frac{AM}{AH} = \frac{\frac{\sqrt{13}}{6}}{\frac{3\sqrt{2}}{2}} = \boxed{\frac{\sqrt{26}}{9}}$$

d. $y = -\frac{1}{2}x + b$

$A(a,0)$

$b(0,b), A(a,0)$

$$0 = -\frac{1}{2}a + b \Rightarrow b = \frac{1}{2}a \Rightarrow a = 2b$$

مساحت: $\frac{|b|}{\sqrt{1+\frac{1}{4}}} = \frac{|b|}{\frac{\sqrt{5}}{2}} = \sqrt{2} \Rightarrow |b| = \omega$

$$\Rightarrow |b| = \omega$$

$$AB = \sqrt{b^2 + a^2} = \sqrt{2\omega^2 + 1}$$

$$= \sqrt{12\omega} = \boxed{\omega\sqrt{12}}$$

$$\begin{cases} my - \varepsilon x = r_m \Rightarrow y = \frac{r}{m}x + r \\ y + mx = x + r \Rightarrow y = (1-m)x + r \end{cases} \rightarrow \begin{matrix} \text{خط موازی} \\ \text{نقطه تقاطع} \end{matrix} \Rightarrow (0, r) \quad -1$$

$$\frac{y}{3} = \frac{r}{3}x + r, \quad \frac{y}{3} = 0 \Rightarrow \frac{r}{3}x + r = 0 \Rightarrow \frac{r}{3}x = -r \Rightarrow x = \frac{-m}{r} \quad y_B = 0$$

$$y_C = (1-m)x_C + r, \quad y_C = 0 \Rightarrow 0 = (1-m)x_C + r \Rightarrow (1-m)x_C = -r \Rightarrow x_C = \frac{r}{m-1} \quad y_C = 0$$

$$\begin{aligned} d_1: y &= 2x - 3 \\ d_m: y &= 2x - \frac{c+w}{r} \\ d_r: y &= 2x - c \end{aligned}$$

$$\begin{aligned} \text{نقطه تقاطع } M \text{ روی } d_m: -r &= \varepsilon - \frac{c+w}{r} \\ \Rightarrow \frac{c+w}{r} &= \gamma \\ \Rightarrow c+w &= 1r \\ \Rightarrow c &= 9 \end{aligned} \quad -9$$

$$\Rightarrow d_r: \boxed{y = 2x - 9}$$

قرینه خط d نسبت به نقطه M ، خطی موازی با d_1 یعنی با شیب 2 است و هم خطی موازی با d_1 و d_r است. M مرکز دایره d و d_r موازی با d و d_1 است.

$$c' = \frac{-c - w}{r}$$

$$\begin{aligned} A'(a, b) \\ d: y &= x + w \\ m_d &= 1 \Rightarrow m_{AA'} = -1 \end{aligned}$$

$$\begin{aligned} y - y_A &= -1(x - x_A) \Rightarrow y - r = -x + 1 \\ \Rightarrow y &= -x + r \end{aligned}$$

M نقطه تقاطع AA' و d است.

$$\Rightarrow 2x = -r \Rightarrow x = -1 \quad y = \varepsilon \rightarrow A', A, M \text{ است}$$

$$\begin{aligned} m \mid \frac{a+1}{r} &= -1 \Rightarrow a+1 = -r \Rightarrow a = -r \\ \frac{b+r}{r} &= \varepsilon \Rightarrow b+r = 1 \Rightarrow b = 4 \end{aligned}$$

$$2b - a = 1r - (-w) = 1r + w = \boxed{15}$$

$$A(0, \gamma) \quad B\left(-\frac{\gamma}{\gamma}, 0\right) \quad C\left(\frac{\gamma}{\gamma-1}, 0\right)$$

: A graph

$$S = \frac{\sigma \times \bar{b} \times \varepsilon(\bar{w})}{\gamma} \rightarrow \gamma \quad \sigma \times \bar{b} = |x_B - x_C| = \frac{\omega}{\gamma} \rightarrow \left| \frac{\gamma}{\gamma-1} + \frac{\gamma}{\gamma} \right| = \frac{\omega}{\gamma}$$

$$\left| \frac{\varepsilon + m^{\gamma} - m}{\gamma m - \gamma} \right| = \frac{\omega}{\gamma} \rightarrow \frac{m^{\gamma} - m + \varepsilon}{\cancel{\gamma m - \gamma}} = \frac{\omega}{\cancel{\gamma}} \Rightarrow m^{\gamma} - m + \varepsilon = \omega m - \omega$$

$$m^{\gamma} - 4m + 9 = 0$$

$$\Rightarrow m = 3$$

$$\frac{m^{\gamma} - m + \varepsilon}{\cancel{\gamma m - \gamma}} = \frac{-\omega}{\cancel{\gamma}} \Rightarrow -\omega m + \omega = m^{\gamma} - m + \varepsilon$$

$$\Rightarrow m^{\gamma} + \varepsilon m - 1 = 0 \rightarrow p = -1$$

$$m_{\text{مقدار}} = -1 \times 3 = \boxed{-3}$$