

$A(3, -4), B(7, 1)$ نقطه میانی پاره خط $AB \rightarrow M$ $\begin{cases} \frac{x_A + x_B}{2} \rightarrow \frac{3+7}{2} = 5 \\ \frac{y_A + y_B}{2} \rightarrow \frac{-4+1}{2} = -\frac{3}{2} \end{cases}$	$\overline{AB}$ شیب خط $\rightarrow \frac{y_B - y_A}{x_B - x_A} = \frac{1 - (-4)}{7 - 3} = \frac{5}{4} = -\frac{5}{4}$ شیب خط عمود $\rightarrow -\frac{4}{5} \times m' = -1 \rightarrow m' = \frac{1}{4}$ معادله خط $\overline{AB}$ $\rightarrow y - 1 = \frac{1}{4}(x - 7) \rightarrow y - 1 = \frac{1}{4}x - \frac{7}{4}$ $\rightarrow y = \frac{1}{4}x + \frac{1}{4}$	۱
$A(3, 1)$ $B(-1, 5)$ $C(-1, 3)$ طول ضلع $BC \rightarrow \sqrt{(y_B - y_C)^2 + (x_B - x_C)^2}$ $\sqrt{(1-3)^2 + (-1-(-1))^2} = \sqrt{4+0} = 2$	فاصله نقطه A از خط $BC =$ طول ارتفاع AH خط $BC \rightarrow m_{BC} = \frac{y_B - y_C}{x_B - x_C} = \frac{5-3}{-1-(-1)} = \frac{2}{0}$ $\rightarrow BC: x = -1$ فاصله A از $BC \rightarrow \frac{ 3(1) + 4(3) - 5 }{\sqrt{4^2 + 9}} = \frac{10}{5} = 2 \rightarrow \boxed{5-2=3}$	۲
$2y = x + 7 \rightarrow m = \frac{1}{2}$ $4y = ax + 2 \rightarrow m = \frac{a}{4} = \frac{1}{2} \rightarrow a = 2$ فاصله دو خط موازی = قطر دایره = $2r$	$2y - x - 7 = 0 \xrightarrow{\times 2} 4y - 2x - 14 = 0$ $4y - ax - 2 = 0 \rightarrow 4y - 2x - 2 = 0$ $\frac{ c - c' }{\sqrt{a^2 + b^2}} = \frac{ -14 - (-2) }{\sqrt{14 + 4}} = \frac{12}{\sqrt{18}} = \frac{4}{\sqrt{5}} = 2r \rightarrow r = \frac{2}{\sqrt{5}}$ مساحت دایره $= \pi r^2 = \left(\frac{2}{\sqrt{5}}\right)^2 \pi = \frac{4}{5} \pi$	۳
$A(2, 3)$ $B(4, 1)$ $C(-1, -3)$ $\rightarrow \overline{AB}$ میانه $\rightarrow M$ $\begin{cases} \frac{x_A + x_B}{2} \rightarrow \frac{2+4}{2} = 3 \\ \frac{y_A + y_B}{2} \rightarrow \frac{3+1}{2} = 2 \end{cases} \rightarrow (3, 2)$ $m_{AB} = \frac{y_B - y_A}{x_B - x_A} = \frac{1-3}{4-2} = -1 \rightarrow AB: y = -x + 5$ $m_{CH} = -1 \times m_{AB} = 1 \rightarrow CH: y = x - 2$ $\begin{cases} y + x = 5 \\ y - x = -2 \end{cases} \rightarrow \begin{cases} y = \frac{3}{2} \\ x = \frac{7}{2} \end{cases} \rightarrow H\left(\frac{7}{2}, \frac{3}{2}\right)$	طول $MH \rightarrow \sqrt{(x_M - x_H)^2 + (y_M - y_H)^2}$ $\sqrt{\left(3 - \frac{7}{2}\right)^2 + \left(2 - \frac{3}{2}\right)^2} = \frac{1}{\sqrt{2}} = \boxed{\frac{\sqrt{2}}{2}}$	۴
$(3m-2)n + (5-m)y - 7 = 0 \rightarrow m_1 = -\frac{3m-2}{5-m}$ $(m+1)n - (2m-4)y + 1 = 0 \rightarrow m_2 = \frac{m+1}{2m-4}$ $m_1 \cdot m_2 = -1 \rightarrow \left(-\frac{3m-2}{5-m}\right) \left(\frac{m+1}{2m-4}\right) = -1$	$\frac{3m-2}{5-m} = \frac{2m-4}{m+1} \rightarrow 3m^2 + m - 2 = -2m^2 + 14m - 20$ $5m^2 - 13m + 18 = 0 \rightarrow \Delta < 0$ برای هیچ مقدار m خط ها بر هم عمود نیستند	۵

$\begin{cases} y = r - n \\ y = r - 1 \end{cases} \rightarrow x = 1, y = 1$ $\begin{cases} y = r - n \\ y = n - r \end{cases} \rightarrow x = \omega, y = -1$ $\begin{cases} y = r - 1 \\ y = \varepsilon - n \end{cases} \rightarrow x = \frac{\omega}{r}, y = \frac{r}{r}$	$A _1 \quad B _{\omega} \quad C _{\frac{\omega}{r}}$ $m_{BC} = \frac{\frac{r}{r} + 1}{\frac{\omega}{r} - \omega} = \frac{10/r}{-10/r} = -1 \rightarrow y+1 = -(n-\omega) = y = -n+\varepsilon$ $M\left(\frac{10}{r}, \frac{r}{r}\right) \Rightarrow AM = \sqrt{\left(\frac{10}{r}\right)^2 + \left(\frac{r}{r}\right)^2} = \frac{\omega\sqrt{r}}{r}$ $AM = \frac{\omega\sqrt{r}}{r} \rightarrow \frac{AM}{AH} = \frac{\frac{\omega\sqrt{r}}{r}}{\frac{r}{\sqrt{r}}} = \frac{10}{r} = \frac{\omega}{r}$ $AH = \frac{ 1+1-\varepsilon }{\sqrt{r}} = \frac{r}{\sqrt{r}}$	6
$\frac{x}{A} + \frac{y}{B} = 1 \rightarrow \frac{x\beta + y\alpha}{AB} = 1 \rightarrow AB = x\beta + y\alpha$ $\frac{\beta}{A} = \frac{1}{r} \rightarrow A = r\beta$ $\frac{ AB }{\sqrt{A^2 + B^2}} = \sqrt{r_0} \rightarrow \frac{r\beta^r}{\sqrt{\omega B^r}} = \sqrt{r_0} \rightarrow \frac{r\beta}{\sqrt{\omega}} = \sqrt{r_0} \rightarrow r\beta = \sqrt{100} = 10 \rightarrow \beta = \omega$ $A = 10$ $\sqrt{r\omega + 100} = \omega\sqrt{\omega}$		7
$my - \varepsilon n = rm \rightarrow y = \frac{r}{m}n + r$ $y + mn = x + r \rightarrow y = (1-m)n + r$ $\frac{r}{m}n + r = (1-m)n + r \Rightarrow \frac{r}{m} = 1-m \quad A _r$ $S = \frac{1}{r} \left \frac{\varepsilon}{m-1} - (-m) \right = \frac{\omega}{r} \rightarrow \left \frac{r+m(m-1)}{m-1} \right = \omega \rightarrow \frac{r+m(m-1)}{m-1} = \omega \rightarrow \omega m - \omega = r + m^2 - m \rightarrow m = r$	$y = \frac{r}{m}n + r \Rightarrow x = \frac{-m}{r} \Rightarrow B _{\frac{-m}{r}}$ $y = (1-m)x + r \Rightarrow x = \frac{-r}{1-m} = \frac{r}{m-1} \Rightarrow C _{\frac{r}{m-1}}$ $-\omega x + \omega = m^r - m + \varepsilon$ $m^r + \varepsilon m - 1 = 0 \rightarrow m = \frac{-\varepsilon \pm r\sqrt{\omega}}{r} \rightarrow \boxed{-r \pm \sqrt{\omega} = m}$	8
$\text{نقطة تقاطع } \rightarrow x=0, y=-r$ $\frac{\alpha+0}{r} = r \rightarrow \alpha = \varepsilon$ $\frac{\beta-r}{r} = -r \rightarrow \beta = -1$ $y = r - r^2$ $\boxed{m=r}$ $y+1 = r(x-\varepsilon) \rightarrow d': y = rx - 9$	$P = (-r+\sqrt{\omega})(-r-\sqrt{\omega})(r),$ $(r-\omega)(r) = -r$	9
$y - r = -(n+1) \Rightarrow y = -n + r$ $-n + r = n + \omega \rightarrow -rn = r \rightarrow n = -1$ $y = \varepsilon$ $\frac{r+b}{r} = \varepsilon \rightarrow b = 4$ $\frac{1+a}{r} = -1 \rightarrow a = -r$ $\boxed{rb - a = 1r + r = \omega}$	$m = \frac{1}{r} = 1 \Rightarrow m' = -1$	10