

$$x_c = \frac{x_A + x_B}{2} = \frac{1 + (-1)}{2} = 0$$

$$y_c = \frac{y_A + y_B}{2} = \frac{4 + 1}{2} = \frac{5}{2}$$

$$\Rightarrow c \parallel l$$

$$a_{AB} = \frac{4 - 1}{1 - (-1)} = \frac{3}{2}$$

$$a_d = -\frac{1}{a_{AB}} = -\frac{2}{3}$$

$$y - y_c = a_d(x - x_c)$$

$$y - \frac{5}{2} = -\frac{2}{3}(x - 0) \Rightarrow y = -\frac{2}{3}x + \frac{5}{2}$$

$$BC = \sqrt{(3 - 1)^2 + (1 - 4)^2} = \sqrt{4 + 9} = \sqrt{13}$$

$$BC \text{ خط } a_{BC} = \frac{1 - 4}{3 - 1} = -\frac{3}{2}$$

$$AH = \frac{|1 \cdot 1 + \frac{2}{3}(3) - \frac{5}{2}|}{\sqrt{1^2 + (\frac{2}{3})^2}} = \frac{|\frac{5}{2} - \frac{5}{2}|}{\sqrt{1 + \frac{4}{9}}} = 0$$

$$y - 3 = -\frac{2}{3}(x + 1)$$

$$y = -\frac{2}{3}x + \frac{10}{3} \Rightarrow y + \frac{2}{3}x - \frac{10}{3} = 0$$

$$BC - AH = \sqrt{13} - 0 = \sqrt{13}$$

$$\Rightarrow \frac{2}{3} = \frac{a}{1} \Rightarrow a = \frac{2}{3} \Rightarrow \begin{cases} 2y - x - 1 = 0 \\ 3y - 2x - 2 = 0 \end{cases} \Rightarrow 2y - x - 1 = 0$$

$$r = \frac{|c' - c|}{\sqrt{a'^2 + b'^2}} = \frac{|-1 - (-1)|}{\sqrt{1^2 + (-2)^2}} = \frac{0}{\sqrt{5}} = 0$$

$$S_{\text{دایره}} = r^2 \pi = \left(\frac{2}{\sqrt{5}}\right)^2 \times \pi \times \frac{1}{4} = \frac{4}{5} \times \pi \times \frac{1}{4} = \frac{\pi}{5}$$

$$AB \text{ خط } a_{AB} = \frac{1 - 4}{-1 - 1} = \frac{3}{2} \Rightarrow y - 1 = \frac{3}{2}(x + 1) \Rightarrow y = \frac{3}{2}x + \frac{5}{2}$$

$$CH \text{ خط } a_{CH} = -\frac{1}{a_{AB}} = -\frac{2}{3} \Rightarrow y - (-3) = -\frac{2}{3}(x - (-1)) \Rightarrow y = -\frac{2}{3}x - \frac{10}{3}$$

$$H = \text{نقطه تقاطع } CH, AB \Rightarrow \begin{cases} y = \frac{3}{2}x + \frac{5}{2} \\ y = -\frac{2}{3}x - \frac{10}{3} \end{cases} \Rightarrow \frac{3}{2}x + \frac{5}{2} = -\frac{2}{3}x - \frac{10}{3} \Rightarrow x_H = -\frac{10}{7}$$

$$M = \text{نقطه تقاطع } \Rightarrow x_M = \frac{1 + 1}{2} = 1$$

$$y_M = \frac{1 + 1}{2} = 1 \Rightarrow MH = \sqrt{\left(\frac{10}{7} - 1\right)^2 + \left(-\frac{10}{3} - 1\right)^2} = \sqrt{\frac{1}{49} + \frac{169}{9}} = \frac{\sqrt{170}}{3}$$

$$a = \frac{m - 1}{m - 2} \quad a' = \frac{m + 1}{m - 2}$$

$$a = -\frac{1}{a'} \Rightarrow \frac{m - 1}{m - 2} = -\frac{m - 2}{m + 1} \Rightarrow m^2 + m - 2 = -m^2 + 3m - 2 \Rightarrow 2m^2 - 2m = 0 \Rightarrow m(m - 1) = 0$$

$$\Delta = 1^2 - 4 \times 2 \times 1 = 1 - 8 = -7$$

از این نتیجه می‌گیریم که خط بر هم عمود نیستند  $\Rightarrow \Delta < 0$

$$\begin{cases} y = -x + 1 \\ -y = -x + 1 \end{cases} \quad A \mid \begin{cases} y = -x + 1 \\ 0 = -x + 1 \Rightarrow x = 1 \Rightarrow y = 0 \end{cases}$$

$$\begin{cases} y = x - 1 \\ -y = x - 1 \end{cases} \quad C \mid \begin{cases} y = x - 1 \\ 0 = x - 1 \Rightarrow x = 1 \Rightarrow y = 0 \end{cases}$$

$$\begin{cases} x = -y + 1 \\ -x = y - 1 \end{cases} \quad B \mid \begin{cases} x = -y + 1 \\ 0 = -y - 1 \Rightarrow y = -1 \Rightarrow x = 2 \end{cases}$$

$$M = \text{center: } x_M = \frac{1+2}{2} = \frac{3}{2}, y_M = \frac{0-1}{2} = -\frac{1}{2} \Rightarrow AM = \sqrt{\left(\frac{3}{2}-1\right)^2 + \left(-\frac{1}{2}-0\right)^2} = \sqrt{\frac{1}{4} + \frac{1}{4}} = \frac{\sqrt{2}}{2}$$

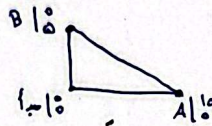
$$BC \text{ line: } a_{BC} = \frac{\frac{1}{2} + 1}{\frac{1}{2} - 2} = -1 \Rightarrow y + 1 = -(x - 2) \Rightarrow y = -x + 1 \Rightarrow y + x - 1 = 0$$

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

$$\sqrt{r_0} = r\sqrt{\omega} = \frac{|ax_0 + by_0 - y_B|}{\sqrt{a^2 + b^2}} = \frac{|-y_B|}{\sqrt{\left(-\frac{1}{r}\right)^2 + 1}} = \frac{|-y_B|}{\frac{\sqrt{\omega}}{r}} \Rightarrow |-y_B| = \omega \Rightarrow y_B = \omega$$

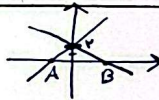
$$y = -\frac{x}{r} + y_B \Rightarrow y = -\frac{x}{r} + \omega$$

$$0 = -\frac{x_A}{r} + \omega \Rightarrow x_A = \omega$$



$$AB = \sqrt{\omega^2 + 0^2} = \sqrt{r^2 \omega} = \boxed{\omega \sqrt{r}}$$

$$y = \frac{r}{m}x + 1 \quad / \quad y = (-m+1)x + 1$$



$$S = \frac{\Delta}{r} = \frac{r \times AB}{r} \Rightarrow AB = \frac{\Delta}{r}$$

$$0 = \frac{r}{m}x + 1 \Rightarrow x = -\frac{m}{r}$$

$$\Rightarrow \textcircled{1} \left( \frac{r}{-m+1} + \frac{m}{r} = \frac{\Delta}{r} \right)^{r(1-m)} \Rightarrow -r - m^2 + m = \Delta - \Delta m$$

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

$$\textcircled{2} \left( \frac{-m}{r} + \frac{r}{-m+1} = \frac{\Delta}{r} \right)^{r(1-m)} \Rightarrow (m-1)^2 = 0 \Rightarrow \boxed{m=1}$$

$$\Rightarrow -m + m^2 + 1 = \Delta - \Delta m \Rightarrow m^2 + 1 = \Delta \Rightarrow m = \frac{\pm\sqrt{\Delta} - 1}{r} = \frac{\pm\sqrt{\Delta} - 1}{r}$$

$$m \text{ values: } (-1 + \sqrt{\Delta})(-1 - \sqrt{\Delta}) \times r = (\Delta - 1) \times r = \boxed{-3}$$

نقطه M روی خط موازی دوم و چهارم <= قرینه خط نسبت به نیمساز خاصه دوم و چهارم <=  $y = -x$  و  $x = -y$

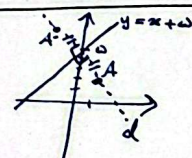
$$-x = r(-y) - r$$

$$-x = -ry - r$$

$$ry = x - r$$

$$\boxed{y = \frac{x}{r} - \frac{r}{r}}$$

$$g = \frac{r-1-\omega}{\sqrt{1^2 + (-1)^2}} = \frac{r}{\sqrt{2}} \Rightarrow \frac{|-x_0 + y_0 - \omega|}{\sqrt{2}} = \frac{r}{\sqrt{2}} \Rightarrow |y_0 - x_0 - \omega| = r$$



$$\Delta \text{ خط } \Rightarrow a = -\frac{1}{1} = -1 \Rightarrow y - r = -(x - 1) \Rightarrow y = -x + 1$$

$$|-x_0 + 1 - x_0 - \omega| = r$$

$$|-2x_0 - r| = r \Rightarrow |-x_0 - 1| = r \Rightarrow -x_0 - 1 = r \Rightarrow x_0 = -r - 1 \Rightarrow y_0 = 6 \Rightarrow \left| \frac{r}{6} \right| \quad A' \text{ نقطه}$$

$$A' \mid \frac{a}{b} \Rightarrow A' \mid \frac{r}{6} \Rightarrow a = -r, b = 6 \quad rb - a = 1r - (-r) = \boxed{1\omega}$$