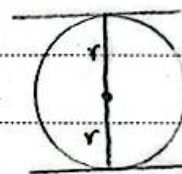


$A(8, -4) \quad B(2, 1) \quad T(3, 1)$
 $m_{AB} = \frac{1-(-4)}{2-8} = -\frac{5}{6} \Rightarrow m' = \frac{6}{5}$
 $y = \frac{6}{5}x + b \xrightarrow{(3,1)} y = \frac{6}{5}x + \frac{1}{5}$

$BC = \sqrt{\Delta x^2 + \Delta y^2} = \sqrt{9+14} = 5$
 $m_{BC} = \frac{1-(-4)}{-8+1} = -\frac{5}{7} \Rightarrow y = -\frac{5}{7}x + b \xrightarrow{(-1,3)} y = -\frac{5}{7}x + \frac{16}{7}$
 $d = \frac{|ax+by+c|}{\sqrt{a^2+b^2}} = \frac{|1+\frac{16}{7}-\frac{1}{5}|}{\sqrt{1+\frac{25}{49}}} = \frac{\frac{10}{7}}{\frac{5}{7}} = 2 \Rightarrow 5-2 = 3$

$ry - x = 5 \Rightarrow y = \frac{1}{r}x + \frac{5}{r}$
 $fy = ax + 2 \Rightarrow y = \frac{a}{f}x + \frac{2}{f}$
 $\frac{1}{r} = \frac{a}{f} \Rightarrow a = \frac{f}{r}$



$\text{فاصله دایره تا خط} = \frac{|c-c'|}{\sqrt{a^2+b^2}} \Rightarrow 2r = \frac{|\frac{5}{r} - \frac{2}{f}|}{\sqrt{1+\frac{1}{f^2}}} = \frac{\frac{5}{r}}{\frac{f}{f^2+1}} = \frac{5}{f} \Rightarrow r = \frac{5}{f} = \frac{5\sqrt{a}}{a}$

$S = \pi r^2 = \frac{25\sqrt{a}}{a} \times \frac{5\sqrt{a}}{a} \pi = \frac{125}{a} \pi$

$B, A \text{ در } M(3, 2) \quad CH \text{ از } M \text{ تا خط} = MH$

$m_{AB} = \frac{2-1}{3-8} = -\frac{1}{5} \Rightarrow m_{CH} = 5 \Rightarrow y = 5x + b \xrightarrow{(-1,3)} y = 5x - 2 \Rightarrow y - 5x + 2 = 0$

$\text{فاصله دایره تا خط} = \frac{|ax+by+c|}{\sqrt{a^2+b^2}} = \frac{|3-10+2|}{\sqrt{1+25}} = \frac{5}{\sqrt{26}} = \frac{\sqrt{26}}{5}$

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

$\Rightarrow -5m^2 - m + 2 = 2m^2 - 15m + 20 \Rightarrow 7m^2 - 14m + 18 \Rightarrow \Delta < 0$

برای هر مقدار m این دایره عمود نیست.

$$AC, AB \text{ " " " } A \Rightarrow \begin{cases} x+2y=4 \\ -2x+y=-1 \end{cases} \xrightarrow{\text{حل}} \begin{aligned} x &= \frac{-2-4}{1+4} = -\frac{6}{5} = -1.2 \\ y &= \frac{-1+2}{1+4} = \frac{1}{5} = 0.2 \end{aligned} \Rightarrow A = (-1.2, 0.2)$$

$$BC, AB \text{ " " " } B \Rightarrow \begin{cases} x+2y=4 \\ x+y=1 \end{cases} \rightarrow \begin{aligned} x &= \frac{4-2}{1-2} = -2 \\ y &= \frac{1-4}{1-2} = 3 \end{aligned} \Rightarrow B = (-2, 3)$$

$$BC, AC \text{ " " " } C \Rightarrow \begin{cases} -2x+y=-1 \\ x+y=1 \end{cases} \rightarrow \begin{aligned} x &= \frac{-1-1}{-2-1} = \frac{2}{3} \\ y &= \frac{1-2}{-2-1} = \frac{1}{3} \end{aligned} \Rightarrow C = \left(\frac{2}{3}, \frac{1}{3}\right)$$

$$C, B \text{ " " " } M = \left(\frac{10}{3}, \frac{2}{3}\right) \rightarrow AM = \sqrt{\Delta x^2 + \Delta y^2} = \sqrt{\left(\frac{14}{3}\right)^2 + \left(\frac{1}{3}\right)^2} = \frac{\sqrt{197}}{3}$$

$$AH = \frac{|1+1-4|}{\sqrt{1+1}} = \frac{2}{\sqrt{2}} = \sqrt{2} \quad \frac{AM}{AH} = \frac{\sqrt{197}}{3\sqrt{2}}$$

$$y = -\frac{1}{\sqrt{2}}x + b \quad \text{با } \vec{a} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \Rightarrow \frac{|ax+by+c|}{\sqrt{a^2+b^2}} \quad d = \sqrt{\Delta x^2 + \Delta y^2} \quad \checkmark$$

$$(0,0) \rightarrow \frac{|0+0-b|}{\sqrt{1+\frac{1}{2}}} = \frac{|b|}{\frac{\sqrt{3}}{2}} = \sqrt{3} \Rightarrow |b| = \sqrt{3} \times \frac{\sqrt{3}}{2} = \frac{3}{2}$$

$$AB = \sqrt{3 \times \frac{3}{4} + 100} = \sqrt{100.75} = \frac{1}{2} \sqrt{403}$$

$$\begin{cases} my - \epsilon x - r = 0 \Rightarrow y = \frac{\epsilon}{m}x + r \\ y + mx = x + r \Rightarrow y = (1-m)x + r \end{cases} \quad \text{با } \vec{a} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \Rightarrow \text{مركز } (0, r)$$

$$y_B = \frac{\epsilon}{m}x_B + r \quad y=0 \Rightarrow \frac{\epsilon}{m}x_B + r = 0 \Rightarrow x_B = -\frac{mr}{\epsilon} \quad y_B = 0$$

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

$$\Rightarrow A(0, r) \quad B\left(-\frac{mr}{\epsilon}, 0\right) \quad C\left(-\frac{r}{m-1}, 0\right)$$

$$|x_B - x_C| = \frac{d}{\epsilon} \Rightarrow \left| -\frac{mr}{\epsilon} + \frac{r}{m-1} \right| = \frac{d}{\epsilon} \rightarrow \frac{m^2 - m + \epsilon}{\epsilon m - \epsilon} = \frac{d}{\epsilon} \Rightarrow m^2 - 4m + 9 = 0 \Rightarrow m = 1$$

$$\frac{m^2 - m + \epsilon}{\epsilon m - \epsilon} = -\frac{d}{\epsilon} \Rightarrow m^2 + \epsilon m - 1 = 0 \Rightarrow m = -1$$

$$\vec{v} = \vec{v}_x(-1) = -\vec{v}$$

$$d_1: y = rx - r \quad d_2: y = rx - c \quad d_3: y = rx - \frac{c+r}{2} \quad \checkmark$$

$$d_2 \text{ موازي } d_1 \Rightarrow -r = \epsilon - \frac{c+r}{2} \Rightarrow c = 9 \Rightarrow d_2: y = rx - 9$$

$$m=1 \Rightarrow m_{AA'} = -1 \quad y - y_A = -1(x - x_A) \Rightarrow y - 2 = -x + 1 \Rightarrow y = -x + 3 \quad -10$$

$$d, AA' \perp \vec{AM} \rightarrow x + 2 = -x + 3 \Rightarrow 2x = -2 \Rightarrow x = -1, y = 5 \rightarrow A', A \perp \vec{AM}$$

$$m = \begin{cases} \frac{a+1}{r} = -1 \Rightarrow \vec{a} = -\vec{r} \\ \frac{b+2}{r} = 2 \Rightarrow b = 4 \end{cases} \rightarrow 2b - a = 12 - (-4) = 16$$