

H, X, O

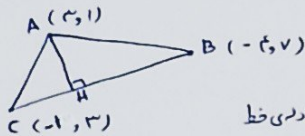
$$A(2, -5), B(7, 1) \Rightarrow m \leq \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-5)}{7 - 2} = \frac{14}{5} \Rightarrow m' \leq -\frac{5}{14}$$

(۱)

خط  $AB$   $\Rightarrow C(\frac{4+7}{2}, \frac{-5+1}{2}) \Rightarrow C(5.5, -2)$   
 حقیقا نقطه وسط باشد

(۲)

معادله خط  $AB$   $\Rightarrow \frac{1}{m}x + b = y$   
 $\frac{1}{m'}x + b' = y$   
 $\frac{1}{-5/14}x + b' = y \Rightarrow b' = \frac{5}{14} \Rightarrow \frac{1}{-5}x + \frac{5}{14} = y$



$BC - AH = 0 - 2 = -2$

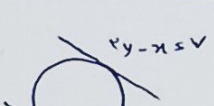
(۳)

خط  $BC \Rightarrow m \leq \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 1}{-5 - (-1)} = \frac{6}{-4} = -\frac{3}{2}$   
 $-\frac{3}{2}x + b = y$   
 $-\frac{3}{2}(-1) + b = 3 \Rightarrow b = \frac{5}{2}$

$-\frac{3}{2}x + \frac{5}{2} = y$

طول  $BC \leq \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(-5 - (-1))^2 + (7 - 1)^2} = \sqrt{16 + 36} = \sqrt{52} = 2\sqrt{13}$

طول  $AH \leq \frac{|ax + by + c|}{\sqrt{a^2 + b^2}} = \frac{|-\frac{3}{2}x + \frac{5}{2} - 1|}{\sqrt{(\frac{3}{2})^2 + (\frac{5}{2})^2}} = \frac{|\frac{-3x + 3}{2}|}{\sqrt{\frac{9}{4} + \frac{25}{4}}} = \frac{3}{\sqrt{34}}$



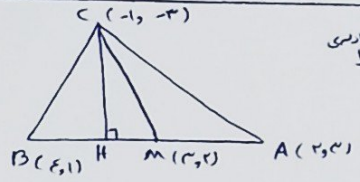
دو خط موازی  $\Rightarrow \frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'} \Rightarrow \frac{1}{1} = \frac{1}{1} = \frac{c}{-1} \Rightarrow c = -1$

(۴)

فاصله نقطه از خط  $= \frac{|ax + by + c|}{\sqrt{a^2 + b^2}} = \frac{|1 \cdot 2 + 1 \cdot 1 - 1|}{\sqrt{1^2 + 1^2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$

(۵)

مساحت  $S = \pi r^2 = (\frac{\sqrt{2}}{2})^2 \pi = \frac{1}{2} \pi$



خط  $AB \Rightarrow m \leq \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 3}{1 - 2} = \frac{-2}{-1} = 2 \Rightarrow m' \leq -\frac{1}{2}$

(۶)

خط  $CH \Rightarrow m \cdot m' = -1 \Rightarrow m' = -\frac{1}{m} = -\frac{1}{2} \Rightarrow \frac{1}{2}x + b = y$

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

(۷)

$M(\frac{4+7}{2}, \frac{1+3}{2}) = M(5.5, 2)$

حل برقرار  $\Rightarrow \frac{m+1}{m-1} \times \frac{m-2}{-2+m} = -1 \Rightarrow \frac{m+1}{m-1} \leq \frac{2-m}{m-2}$

طول  $MH = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(5.5 - 2)^2 + (2 - 1)^2} = \sqrt{12.25 + 1} = \sqrt{13.25} = \frac{\sqrt{53}}{2}$

(۸)

$L_1 \Rightarrow (m+1)x - (2m-1)y + 1 = 0 \Rightarrow d \leq \frac{m+1}{2m-1}$

$L_2 \Rightarrow (2m-2)x + (2-m)y - 1 = 0 \Rightarrow d' \leq \frac{2m-2}{-2+m}$

$m^2 - 13m + 40 = 0 \Rightarrow \Delta < 0$   
 برای هیچ مقدار حقیقی m دو خط بر هم عمود نیستند

✓  $p = \frac{c}{\lambda} \approx (-1)$