

الف)  $m = \frac{\Delta y}{\Delta x} = \frac{-2-2}{0-4} = -1$  (مماسه خط)  $(4, 2)$  و  $(0, 0)$   
 $y = -x + c \xrightarrow{(4, 2)} 2 = -4 + c \Rightarrow c = 6$   
 $y = -x + 6$

ب) با خط  $4x + 2y = 1$  موازی باشد:

$m = \frac{-a}{b} = \frac{-4}{2} = -2$   
 معادله خط:  $y = -2x + 11$

$y = -2x + c \xrightarrow{(4, 2)} 2 = -8 + c \Rightarrow c = 10$

ج) بر خط  $x + 2y = 1$  عمود باشد:  
 $m = \frac{-a}{b} = \frac{-1}{2} = -\frac{1}{2}$   $m' = 2$   $y = 2x + c \xrightarrow{(4, 2)} 2 = 8 + c \Rightarrow c = -6$   
 $y = 2x - 6$

د) زاویه  $\tan \alpha = \sqrt{3} \Rightarrow \frac{\pi}{3}$   
 $y = \sqrt{3}x + c \xrightarrow{(4, 2)} 2 = 4\sqrt{3} + c \Rightarrow c = 2 - 4\sqrt{3}$   
 $y = \sqrt{3}x + (2 - 4\sqrt{3})$

۲ الف)  $(2, 3)$  و  $(1, 7)$  فاصله:  $d = \sqrt{(2-1)^2 + (3-7)^2} = \sqrt{16} = 4$   
 $d = \frac{|2 \times 7 + 3 \times 1 - 1|}{5} = 4$

۳ الف)  $2x + 3y - 9$ ,  $4x + 4y - 1$  معادله خط موازی  
 $\Rightarrow 2x + 3y - 9 = 0$  و  $4x + 4y - 1 = 0$   
 $\Rightarrow 2x + 3y = 9$  و  $2x + 2y = \frac{1}{2}$   
 $\Rightarrow x - y = \frac{17}{2}$   
 $d = \frac{|c - c'|}{\sqrt{a^2 + b^2}} = \frac{|1 - 9|}{\sqrt{20}} = \frac{8}{\sqrt{20}} = \frac{2\sqrt{10}}{5}$

۴ (دوطرفه موازی هستند)  
 $\frac{2x - 3y - 1}{\sqrt{4+9}} = \frac{2x + 3y - 2}{\sqrt{4+9}}$   $\frac{2}{1} \neq \frac{-3}{1}$   
 $\Rightarrow \begin{cases} 2x - 3y - 1 = 2x + 3y - 2 \Rightarrow x - 6y + 1 = 0 \\ 2x - 3y - 1 = -(2x + 3y - 2) \Rightarrow 4x + 6y - 3 = 0 \end{cases}$

۵ (دوطرفه موازی هستند):  
 $y + 2x - 5 = 0 \Rightarrow m = -2$   $\tan \alpha = \frac{|m - m'|}{|1 + mm'|} = \frac{|2 - (-2)|}{|1 + (-4)|} = 1 \Rightarrow \alpha = \frac{\pi}{4}$   
 $y - 2x - 8 = 0 \Rightarrow m = 2$

۶ الف)  $d = \sqrt{(-2-4)^2 + (2-(-5))^2} = 10$   
 $x = \frac{4-5}{2} = -\frac{1}{2}$   $y = \frac{-2+4}{2} = 1$   $A(-\frac{1}{2}, 1)$

۷ الف)  $x = \frac{4-2-1 \cdot 0}{2} = -\frac{1}{2}$   $y = \frac{1+2+(-1 \cdot 3)}{2} = -\frac{1}{2}$   $A(-\frac{1}{2}, -\frac{1}{2})$   
 $S = \frac{1}{2} \begin{vmatrix} 4 & 1 & 1 \\ -2 & 2 & 1 \\ -1 & -1 & 1 \end{vmatrix}$   
 $\Rightarrow \frac{(4+2-1) - (-2-2-4)}{2} = 11$

$$y = \frac{r_{n+1}}{r_n - r}$$

$$-y = \frac{r_{n+1}}{r_n - r} \quad (\text{الف})$$

$$y = \frac{-r_{n+1}}{-r_n - r}$$

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$$x = \frac{ry + 1}{ry - r} \Rightarrow rny - r_n = ry + 1 \Rightarrow$$

(ج)

$$rny - ry = r_{n+1} \Rightarrow y(r_n - r) = r_{n+1} \Rightarrow y = \frac{r_{n+1}}{r_n - r}$$

$$-x = \frac{-ry + 1}{-ry - r} = rny + r_n = -ry + 1 \rightarrow rny + ry = 1 - r_n$$

(د)

$$y(r_n + r) = 1 - r_n \rightarrow y = \frac{1 - r_n}{r_n + r}$$

$$y = \frac{r_{n+1}}{r_n - r}$$

$$\begin{aligned} x' &= x - r & x &= x' + r \\ y' &= y + r & y &= y' - r \end{aligned} \quad \begin{aligned} &\xrightarrow{\text{مباين}} \\ &\xrightarrow{\text{جمع}} \end{aligned}$$

٩ A (r, -r) (الف)

$$y' - r = \frac{r_{n+1} + r + 1}{x' + r - r} \Rightarrow y' - r = \frac{r_{n+1} + 1}{x' - 1} \Rightarrow y' = \frac{r_{n+1} + 1}{x' - 1} + r$$

$$x' = x - r \Rightarrow x = x' + r$$

$$y' = y + r \Rightarrow y = y' - r$$

$$\rightarrow y' + r = \frac{r_{n+1} + 1}{x' + r - r} \Rightarrow y' = \frac{r_{n+1} + 1}{x' - 1} - r$$

A (r, r) (ب)

$$\begin{cases} r_n + ry = r \\ n - 5y = 1 \end{cases}$$

$$\xrightarrow{\text{مباين}} \begin{cases} r_n + ry = r \\ r_n - 10y = r \end{cases} \quad \text{الف) ضرب}$$

$$19y = -1 \Rightarrow y = \frac{-1}{19} \quad x = \frac{14}{19}$$

$$\Rightarrow x = \frac{\begin{vmatrix} r & r \\ -5 & 1 \end{vmatrix}}{\begin{vmatrix} r & r \\ 1 & -5 \end{vmatrix}} = \frac{r - (-1)}{-10 - r} = \frac{14}{-19}$$

$$y = \frac{\begin{vmatrix} r & r \\ 1 & 1 \end{vmatrix}}{\begin{vmatrix} r & r \\ 1 & -5 \end{vmatrix}} = \frac{r - r}{-10 - r} = \frac{1}{-19}$$