

الف) $m = \frac{2-2}{8-2} = -2$ $y = ax + b$ $\xrightarrow{(4,2)}$ $2 = -4(2) + b \rightarrow b = 18 \Rightarrow y = -2x + 18$

ب) $2y + 4x + 1 = 0 \xrightarrow{\text{ضرب}} \frac{-4}{2} = -2 \xrightarrow{(4,2)}$ $2 = -3(2) + b \rightarrow b = 14 \Rightarrow y = -2x + 14$

ج) $x + 3y = 1 \xrightarrow{\text{ضرب}} \frac{-1}{3} = -\frac{1}{3} \xrightarrow{(4,2)}$ $2 = 3(2) + b \rightarrow b = -10 \Rightarrow y = -\frac{1}{3}x - 10$

د) $y - y_0 = m(x - x_0) \rightarrow y - 2 = \sqrt{3}(x - 2) \rightarrow y - 2 = \sqrt{3}x - 2\sqrt{3} \Rightarrow y = \sqrt{3}x - 2\sqrt{3} + 2$
 $\frac{\pi}{3} = 40^\circ = \tan 40^\circ = \sqrt{3}$

الف) $\sqrt{(2-3)^2 + (-1-2)^2} = \sqrt{1+9} = \sqrt{10}$

ب) $\frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}} = \frac{3(2) + 4(3) - 13}{\sqrt{25}} = \frac{10}{5} = 2$

$\begin{cases} 2x + 3y - 4 = 0 \\ 5x + 4y - 12 = 0 \end{cases} \xrightarrow{\times 2} \begin{cases} 2x + 3y - 4 = 0 \\ 10x + 8y - 24 = 0 \end{cases}$

الف) $ax + by + \frac{c+c'}{2} = 5x + 4y + \frac{(-12-4)}{2} = 5x + 4y - 8 = 0$

ب) $\frac{|c-c'|}{\sqrt{a^2+b^2}} = \frac{|-4+12|}{\sqrt{(5)^2+(4)^2}} = \frac{8}{\sqrt{41}} = \frac{8}{\sqrt{41}}$

$\frac{|ax+by+c|}{\sqrt{a^2+b^2}} = \frac{|a'x+b'y+c'|}{\sqrt{(a')^2+(b')^2}} \rightarrow \frac{|2x-3y-1|}{\sqrt{13}} = \frac{|2x+3y-3|}{\sqrt{13}}$

$\rightarrow |2x-3y-1| = |2x+3y-3| \rightarrow \begin{cases} 2x-3y-1 = 2x+3y-3 \rightarrow y = \frac{x}{3} + \frac{1}{3} \\ 2x-3y-1 = -(2x+3y-3) \rightarrow y = -\frac{4}{3}x + \frac{2}{3} \end{cases}$

$\tan \alpha = \left| \frac{m-m'}{1+mm'} \right| \rightarrow \tan \alpha = \left| \frac{-2-2}{1+(-4)} \right| = 1 \rightarrow \alpha = 45^\circ \text{ یا } \frac{\pi}{4}$

$\begin{cases} y = 2x + 1 \rightarrow m = 2 \\ y = 2x + 8 \rightarrow m = 2 \end{cases}$

الف) $\sqrt{(3-(-5))^2 + (-2-4)^2} = \sqrt{100} = 10$

ب) $\left(\frac{x_A + x_B}{2}, \frac{y_A + y_B}{2} \right) \rightarrow \left(\frac{-2}{2}, \frac{2}{2} \right) = (-1, 1)$

الف) $x_G = \frac{x_1 + x_2 + x_3}{3} = \frac{-10 - 2 + 3}{3} = -3$
 $y_G = \frac{y_1 + y_2 + y_3}{3} = \frac{-3 + 2 + 1}{3} = 0$
 $G(-3, 0)$

ب) $S = \frac{1}{3} \begin{vmatrix} 3 & -2 & -10 \\ 1 & 3 & -3 \\ 1 & 1 & 1 \end{vmatrix} = \frac{1}{3} (9 + 24 + (-10) + 30 + 39 + 3) = \frac{1}{3} \times 94 = 31.33$

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

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

ب) $y = \frac{-2x+1}{-x-3}$

ج) $x = \frac{2y+1}{y-3} \rightarrow y = -\frac{-2x-1}{x-3} \Rightarrow y = \frac{2x+1}{x-3}$

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

الف) $\begin{cases} x' = -x \\ y' = y - \beta \end{cases} \quad y = \frac{2x+1}{x-3} \quad \frac{d}{dt} \left(\frac{2x+1}{x-3} \right) \Big|_{x'=x-3} \rightarrow \begin{cases} x = x' + 3 \\ y = y' + 3 \end{cases} \rightarrow y' = \frac{2(x'+3)+1}{(x'+3)-3} = \frac{2x'+7}{x'}$

ب) $y = \frac{2x+1}{x-3} \quad \frac{d}{dt} \left(\frac{2x+1}{x-3} \right) \Big|_{x'=x-3} \rightarrow \begin{cases} x' = x-3 \\ y' = y-3 \end{cases} \rightarrow \begin{cases} x = x' + 3 \\ y = y' + 3 \end{cases} \rightarrow y' + 3 = \frac{2(x'+3)+1}{x'+3-3} = \frac{2(x'+3)+1}{x'}$
 $\rightarrow y' = \frac{2x'+7}{x'}$

الف) $\begin{cases} 3x + 4y = 2 \\ -3(x - 8y = 1) \end{cases} \rightarrow \begin{cases} 3x + 4y = 2 \\ -3x + 24y = -3 \end{cases} \xrightarrow{+} 28y = -1 \rightarrow y = -\frac{1}{28}$
 $\xrightarrow{\text{Subst}} 3x - \frac{3}{28} = \frac{2}{19} \rightarrow x = \frac{2}{19 \times 28} = \frac{12}{19}$

ب) $\begin{cases} 3x + 4y = 2 \\ x - 8y = 1 \end{cases}$

$x = -\frac{14}{-19} = \frac{14}{19}$

$y = \frac{1}{-19}$

دترمینان $= \begin{vmatrix} 3 & 4 \\ 1 & -8 \end{vmatrix} = -24 - 4 = -28$

دترمینان $= \begin{vmatrix} 3 & 2 \\ -8 & 1 \end{vmatrix} = 3 + 16 = 19$

دترمینان $= \begin{vmatrix} 3 & 2 \\ 1 & 1 \end{vmatrix} \rightarrow 3 - 2 = 1$