

$$m = \frac{y_2 - y_1}{x_2 - x_1}, y = mx + b, m = \tan(\alpha)$$

$$m = \frac{2 - (-2)}{1 - 0} = -4 \quad y = -4x + b \xrightarrow{(1,2)} 2 = -4 + b \rightarrow b = 6 \rightarrow y = -4x + 6$$

$$m = \frac{-4}{1} = -4 \xrightarrow{m' = \frac{1}{m}} m' = -\frac{1}{4} \rightarrow y = -\frac{1}{4}x + b \xrightarrow{(5,2)} 2 = -\frac{5}{4} + b \rightarrow b = \frac{13}{4} \rightarrow y = -\frac{1}{4}x + \frac{13}{4}$$

$$m = \frac{-1}{1} = -1 \xrightarrow{m' = \frac{1}{m}} m' = 1 \rightarrow y = x + b \xrightarrow{(4,2)} 2 = 4 + b \rightarrow b = -2 \rightarrow y = x - 2$$

$$m = \tan \frac{\pi}{4} = 1 \rightarrow y = x + b \xrightarrow{(1,2)} 2 = 1 + b \rightarrow b = 1 \rightarrow y = x + 1$$

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$$3x + 4y - 12 = 0 \quad x^2 + y^2 = 1$$

$$d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}} = \frac{|3(-1) + 4(0) - 12|}{\sqrt{3^2 + 4^2}} = \frac{|-15|}{5} = 3$$

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$$\frac{|C - C'|}{\sqrt{a^2 + b^2}}, \begin{cases} ax + by + C = 0 \\ ax + by + C' = 0 \end{cases}$$

$$3x + 4y - 4 = 0, 3x + 4y - 6 = 0$$

$$\rightarrow \frac{|-4 - (-6)|}{\sqrt{3^2 + 4^2}} = \frac{|2|}{5} = \frac{2}{5}$$

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

$$\begin{cases} 3x - 4y - 1 = 0 \\ 3x + 4y - 3 = 0 \end{cases} \rightarrow \frac{|3x - 4y - 1|}{\sqrt{3^2 + 4^2}} = \frac{|3x + 4y - 3|}{\sqrt{3^2 + 4^2}} \rightarrow |3x - 4y - 1| = |3x + 4y - 3|$$

$$\begin{cases} 1) 3x - 4y - 1 = 3x + 4y - 3 \rightarrow x - 4y + 2 = 0 \\ 2) 3x - 4y - 1 = -(3x + 4y - 3) \rightarrow 6x - 8y + 4 = 0 \rightarrow 3x - 4y + 2 = 0 \end{cases}$$

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$$\tan \alpha = \left| \frac{m - m'}{1 + mm'} \right| \quad (\beta = 180^\circ - \alpha)$$

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

$$y - 2x = 5 \rightarrow m' = \frac{1}{2}$$

$$\tan \alpha = \left| \frac{-\frac{1}{2} - \frac{1}{2}}{1 + (-\frac{1}{2})(\frac{1}{2})} \right| = \left| \frac{-1}{\frac{3}{4}} \right| = \frac{4}{3} \rightarrow \alpha = \frac{\pi}{r} = 53^\circ$$

$$(\beta = 180^\circ - \alpha \rightarrow \beta = 180^\circ - 53^\circ = 127^\circ)$$

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(-5, 2) (-2, 5)

(الف) معادلات نقطه وسطی و این نقطه A, B

(الف) معادلات نقطه وسطی و این نقطه A(2, -2) و B(-2, 5)

$$m(x, y) = \begin{cases} x' = \frac{x_A + x_B}{2} \\ y' = \frac{y_A + y_B}{2} \end{cases} \Rightarrow \begin{cases} x' = \frac{-2+2}{2} = -1 \\ y' = \frac{5-2}{2} = \frac{3}{2} \end{cases}$$

$m: (-1, 1)$

$$AB = \sqrt{(x_A - x_B)^2 + (y_A - y_B)^2}$$

$$AB = \sqrt{(-2-2)^2 + (5-(-2))^2} = 10$$

(ب) ماتریس شلث

$$S = \frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \end{vmatrix} \Rightarrow S = \frac{1}{2} \begin{vmatrix} -10 & -2 & 3 \\ -12 & 2 & 1 \\ 1 & 1 & 1 \end{vmatrix}$$

$$= -10 - 2 - 29 - 9 - (-10) - 12 = -94$$

$$S = \frac{1}{2} \times |-94| \Rightarrow S = 47$$

(الف) مرکز ثقل شلث

$$x_G = \frac{x_A + x_B + x_C}{3} = \frac{-10 - 2 + 3}{3} = -\frac{9}{3} = -3$$

$$y_G = \frac{y_A + y_B + y_C}{3} = \frac{-12 + 2 + 1}{3} = -\frac{9}{3} = -3$$

$G: (-3, -3)$

الف) ضابطه $y = \frac{2x+1}{5x-3}$ نسبت به محور x

ب) ضابطه $x = \frac{2y+1}{5y-3}$ نسبت به محور y

ج) ضابطه $y = \frac{2x+1}{5x-3}$ نسبت به خط $y=x$

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$$y = \frac{2x+1}{5x-3} \text{ و } O'(\alpha, \beta) \rightarrow \begin{cases} x' = x - \alpha \\ y' = y - \beta \end{cases}$$

$$\begin{cases} x' = x - 2 \rightarrow x = x' + 2 \\ y' = y + 2 \rightarrow y = y' - 2 \end{cases}$$

$$y' - 2 = \frac{2(x' + 2) + 1}{5(x' + 2) - 3} = \frac{2x' + 5}{5x' + 7} \rightarrow y' = \frac{2x' + 5}{5x' + 7} + 2 = \frac{2x' + 5 + 10x' + 14}{5x' + 7} = \frac{12x' + 19}{5x' + 7}$$

$$\begin{cases} x' = x - 2 \rightarrow x = x' + 2 \\ y' = y - 2 \rightarrow y = y' + 2 \end{cases}$$

$$y' + 2 = \frac{2(x' + 2) + 1}{5(x' + 2) - 3} = \frac{2x' + 5}{5x' + 7} \rightarrow y' = \frac{2x' + 5}{5x' + 7} - 2 = \frac{2x' + 5 - 10x' - 14}{5x' + 7} = \frac{-8x' - 9}{5x' + 7}$$

(الف) روش حذف:

$$\begin{cases} 3x + 4y = 2 \\ x - 2y = 1 \end{cases} \Rightarrow \begin{vmatrix} 3 & 4 \\ 1 & -2 \end{vmatrix} = -6 - 4 = -10$$

$$x = -\frac{14}{-10} = \frac{14}{10} = \frac{7}{5}$$

$$y = \frac{1}{-10} = -\frac{1}{10}$$

محصولات: $\begin{vmatrix} 3 & 4 \\ 1 & -2 \end{vmatrix}$ و $\begin{vmatrix} 3 & 4 \\ 1 & -2 \end{vmatrix}$

(الف) روش حذف:

$$\begin{cases} 3x + 4y = 2 \\ x - 2y = 1 \end{cases} \Rightarrow \begin{vmatrix} 3 & 4 \\ 1 & -2 \end{vmatrix} = -6 - 4 = -10$$

$$3x + 4\left(-\frac{1}{10}\right) = 2 \rightarrow 3x = \frac{24}{10} = \frac{12}{5}$$

$$x = \frac{12}{10} = \frac{6}{5}$$

$= 4 - (-10) = 14$ و $= 3 - 2 = 1$