

$$\text{الف) } y^3 = 2x^2 - 1 \Rightarrow \left. \begin{aligned} y_1^3 &= 2x_1^2 - 1 \\ y_2^3 &= 2x_2^2 - 1 \end{aligned} \right\} \begin{aligned} x_1 &= x_2 \\ y_1^3 &= y_2^3 \Rightarrow y_1 = y_2 \end{aligned} \quad \text{جواب} \quad (1)$$

$$\text{ب) } y^3 + y = 2x^2 - 1 \Rightarrow \left\{ \begin{aligned} y_1^3 + y_1 &= 2x_1^2 - 1 \\ y_2^3 + y_2 &= 2x_2^2 - 1 \end{aligned} \right. \xrightarrow{x_1 = x_2} \begin{aligned} y_1^3 + y_1 &= y_2^3 + y_2 \\ y_1^3 - y_2^3 + y_1 - y_2 &= 0 \\ (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + y_1 + y_2) &= 0 \end{aligned}$$

$$\Rightarrow y_1 = y_2 \quad \text{جواب}$$

$$= (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + y_1 + y_2) = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-y_2 \pm \sqrt{y_2^2 - 4(y_2^2 + y_2 + 1)}}{2(1)}$$

$$= \frac{-y_2 \pm \sqrt{y_2^2 - 4y_2^2 - 4y_2 - 4}}{2} = \frac{-y_2 \pm \sqrt{-3y_2^2 - 4y_2 - 4}}{2} \Rightarrow \Delta < 0 \Rightarrow y_1 = y_2 \quad \text{جواب}$$

$$\text{الف) } y = x^2 - 1 \Rightarrow \left. \begin{aligned} y_1 &= x_1^2 - 1 \\ y_2 &= x_2^2 - 1 \end{aligned} \right\} \begin{aligned} x_1 &= x_2 \\ y_1 &= y_2 \end{aligned} \quad \text{جواب} \quad (2)$$

$$\text{ب) } |y| + xy = x^2 + 1 \Rightarrow \left\{ \begin{aligned} |y_1| + x_1 y_1 &= x_1^2 + 1 \\ |y_2| + x_2 y_2 &= x_2^2 + 1 \end{aligned} \right. \xrightarrow{x_1 = x_2} \begin{aligned} |y_1| + x_1 y_1 &= |y_2| + x_1 y_2 \\ |y_1| + x_1 y_1 &= |y_2| + x_1 y_2 \end{aligned} \Rightarrow x_1 = 0 \Rightarrow |y_1| = |y_2| \Rightarrow y_1 = \pm y_2$$

$$\text{ج) } y^3 + x = 2x - 1 \Rightarrow y^3 = x + 2x - 1 \Rightarrow y^3 = 3x - 1 \Rightarrow \left\{ \begin{aligned} y_1^3 &= 3x_1 - 1 \\ y_2^3 &= 3x_2 - 1 \end{aligned} \right. \xrightarrow{x_1 = x_2} y_1^3 = y_2^3 \Rightarrow y_1 = y_2$$

$$\text{د) } \sqrt[3]{y} + \sqrt[3]{x} = 2 \Rightarrow \left\{ \begin{aligned} \sqrt[3]{y_1} + \sqrt[3]{x_1} &= 2 \\ \sqrt[3]{y_2} + \sqrt[3]{x_2} &= 2 \end{aligned} \right. \xrightarrow{x_1 = x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2 \quad \text{جواب}$$

$$\text{الف) } \tan \frac{\pi}{3} \rightarrow \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}} \quad (3)$$

$$\text{ب) } \cot \frac{\sqrt{\pi}}{6} \rightarrow \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$$

$$\text{ج) } \tan 330^\circ \rightarrow \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{1}{\sqrt{3}}$$

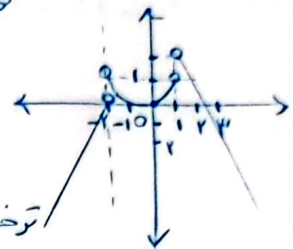
$$\text{د) } \cot 180^\circ \rightarrow \frac{-1}{0} \Rightarrow \text{ن.م}$$

$$\text{الف) } \sin a = \frac{1}{2} \Rightarrow a = 30^\circ, 150^\circ \Rightarrow \frac{\pi}{6}, \frac{5\pi}{6}$$

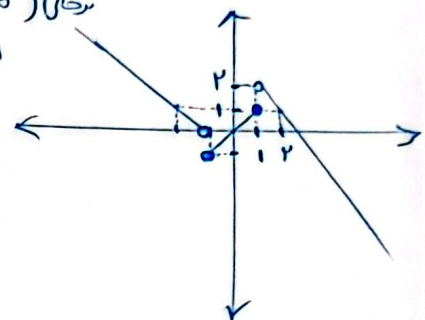
$$\text{ب) } \cos a = \frac{\sqrt{2}}{2} \Rightarrow a = 45^\circ, 135^\circ \Rightarrow \frac{\pi}{4}, \frac{3\pi}{4}$$

(4)

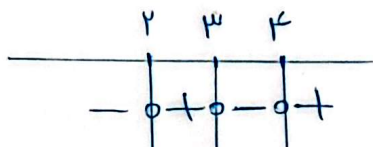
$$f(x) = \begin{cases} -2x+1 & x > 1 \rightarrow y = -2x+1 \Rightarrow (x=1, y=2) \text{ ترخال} \\ x^2 & -1 < x < 1 \rightarrow y = x^2 \Rightarrow (x=1, y=1) \text{ ترخال}, (x=-1, y=1) \text{ ترخال} \\ x+1 & x < -1 \rightarrow y = x+1 \Rightarrow (x=-1, y=0) \text{ ترخال} \end{cases} \quad (5)$$



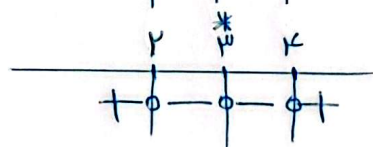
$$f(x) = \begin{cases} -x+3 & x > 1 \rightarrow y = -x+3 \Rightarrow (x=1, y=2) \text{ ترخال} \\ x^3 & -1 < x < 1 \rightarrow y = x^3 \Rightarrow (x=1, y=1), (x=-1, y=-1) \text{ ترخال} \\ -x-1 & x < -1 \rightarrow y = -x-1 \Rightarrow (x=-1, y=0) \text{ ترخال} \end{cases} \quad (6)$$



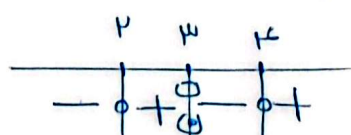
الف) $y = (x-2)(x-3)(x-4)$



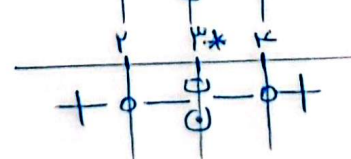
ب) $y = (x-2)(x-3)^2(x-4)$



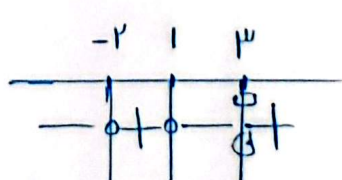
الف) $y = \frac{(x-2)(x-4)}{x-3}$



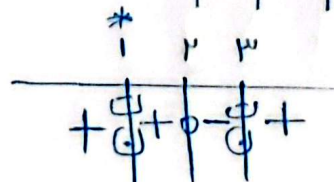
ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$



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



ب) $y = \frac{x^2-3x+2}{x^2-4x+3} = \frac{(x-1)(x-2)}{(x-1)(x-3)}$



الف) $y_2 = \frac{x^4 - x^2}{x^2 + x + 2} = \frac{(x^2)^2 - x^2}{(x^2 + x + 2)}$ $\rightarrow 1, 0, -1$

$\Delta < 0$

$\begin{array}{c|c|c|c} -1 & 0 & 1 & \\ \hline - & + & + & + \end{array}$

(10)

ب) $y_2 = \frac{x^3 + 3x + 4}{x^2 + 2x + 3}$ $\Delta < 0, a > 0$ $\rightarrow +$

عبارت مثبت $\Rightarrow$