

(الف) تابع است.

$$\left. \begin{aligned} y_1^3 &= 3x_1^2 - 1 \\ y_2^3 &= 3x_2^2 - 1 \end{aligned} \right\} \xrightarrow{x_1 = x_2} y_1^3 = y_2^3 \rightarrow y_1 = y_2$$

(ب) تابع است

$$\left. \begin{aligned} y_1^3 + y_1 &= 3x_1^2 - 1 \\ y_2^3 + y_2 &= 3x_2^2 - 1 \end{aligned} \right\} \xrightarrow{x_1 = x_2} y_1^3 + y_1 = y_2^3 + y_2 \rightarrow y_1^3 + y_1 - y_2^3 - y_2 = 0$$

$$(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0 \rightarrow y_1 - y_2 = 0 \rightarrow y_1 = y_2$$

(۲) (الف) تابع است.

$$y = x^2 - 1$$

$$|y| + xy = x^2 + 1 \xrightarrow{x=0} |y| + 0 = 0 + 1 \rightarrow |y| = 1$$

$$y \rightarrow \pm 1$$

تابع نیست

(ج) تابع است

$$\left. \begin{aligned} y_1^3 + x_1^3 &= 2x_1 - 1 \\ y_2^3 + x_2^3 &= 2x_2 - 1 \end{aligned} \right\} \xrightarrow{x_1 = x_2} y_1^3 = y_2^3 \rightarrow y_1 = y_2$$

$$\left. \begin{aligned} \sqrt[3]{y_1} + \sqrt[3]{x_1} &= 2 \\ \sqrt[3]{y_2} + \sqrt[3]{x_2} &= 2 \end{aligned} \right\} \xrightarrow{x_1 = x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} = y_1^{\frac{1}{3}} = y_2^{\frac{1}{3}} \rightarrow y_1 = y_2$$

تابع است

$$\tan \frac{\pi}{3} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$$

(٣ الف)

$$\cot \frac{\sqrt{\pi}}{9} = \frac{1 + \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$$

(ب)

$$\tan 330^\circ = \tan \frac{11\pi}{6} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}}$$

(ج)

$$\cot 180^\circ = \cot \pi = \frac{-1}{0} \rightarrow \text{تعريف ليس له}$$

(د)

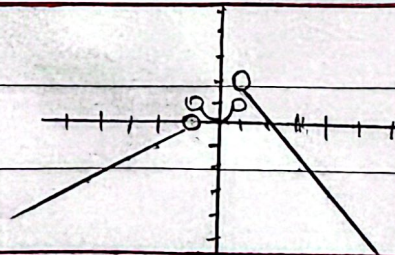
$$\sin \alpha = \frac{1}{2} \rightarrow \alpha = \frac{\pi}{6}, \frac{5\pi}{6}$$

(٤ الف)

$$\cos \alpha = \frac{\sqrt{2}}{2} \rightarrow \alpha = \frac{\pi}{4}, \frac{7\pi}{4}$$

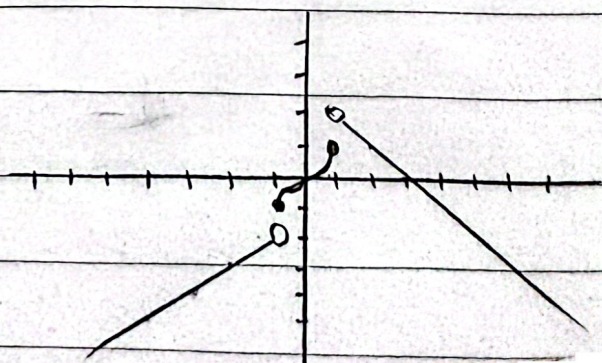
(ب)

$$f(x) = \begin{cases} -x+2 & x > 1 \\ x^2 & -1 < x < 1 \\ x+1 & x < -1 \end{cases}$$



(٥)

$$f(x) = \begin{cases} -x+x & x > 1 \\ x^2 & -1 \leq x \leq 1 \\ -x-1 & x < -1 \end{cases}$$



(٦)

$$y = (x-2)(x-3)(x-4)$$

$$-\frac{2}{x-2} + \frac{3}{x-3} - \frac{4}{x-4}$$

(الف) ٧

$$y = (x-2)(x-3)^2(x-4)$$

$$+\frac{2}{x-2} - \frac{3}{x-3} - \frac{4}{x-4}$$

(ب)

$$y = \frac{(x-2)(x-4)}{x-3}$$

$$-\frac{2}{x-2} + \frac{3}{x-3} - \frac{4}{x-4}$$

(الف) ٨

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

$$+\frac{2}{x-2} - \frac{3}{x-3} - \frac{4}{x-4}$$

(ب)

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

$$-\frac{1}{x-2} + \frac{2}{x-3} - \frac{3}{x-4}$$

(الف) ٩

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

$$+\frac{1}{x-3} + \frac{2}{x-4} - \frac{3}{x-5}$$

(ب)

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

(الف) ١٥

$$-\frac{1}{x-2} + \frac{0}{x-3} - \frac{1}{x-4}$$

$$1 - \Delta = \ominus \Delta$$

$$-\Delta = \Delta$$

$$y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3} \rightarrow 9 - 19\Delta \ominus \Delta \Rightarrow \Delta = 7 -$$

(ب)

$$x^2 + 2x + 3 \rightarrow 4 - 12\Delta \ominus \Delta \Rightarrow \Delta = 7 -$$