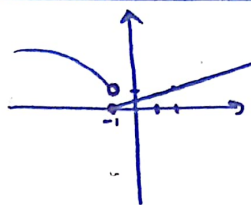


$$x \begin{cases} 3y-1 & y \geq 0 \rightarrow 3y-1=x \rightarrow \frac{x+1}{3} \\ -y^2 & y > 0 \rightarrow x=-y^2 \rightarrow \sqrt{-x}=y \end{cases}$$

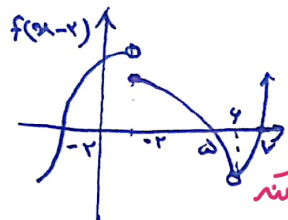


تابع است ✓

سوال (۱)

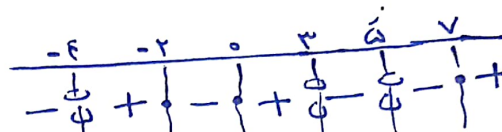
(۲)

$$g(x) = \frac{x f(x-2)}{f(x)} \quad \begin{matrix} \text{• } x f(x-2) \rightarrow -2, 0, 2 \\ f(x) \rightarrow -4, 3, 0 \end{matrix}$$



$f(x) \rightarrow -4, 3, 0$

$f(x-2) \rightarrow -2, 0, 2$



$$D_g = (-4, -2] \cup [0, 3) \cup [4, +\infty) \checkmark$$

فقط خواست باشد که $x=4$ در دامنه f و $x=4$ در دامنه $f(x-2)$ نیست که در بازه است افده نیست

سوال (۲)

(۲)

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

$$x^3 - 4x = 0 \rightarrow x(x^2 - 4) = 0 \rightarrow x = 0, -2, 2$$

$$\text{الف) } D_f = \mathbb{R} - \{\text{ریشه‌های } f\} \rightarrow D_f = \mathbb{R} - \{-2, 0, 2\} \checkmark$$

$$\text{ب) } \sqrt{\frac{x^2 - 3x + 2}{x^3 - 4x}} \rightarrow \frac{x^2 - 3x + 2}{x^3 - 4x} \geq 0 \rightarrow x^3 - 4x > 0 \quad D = (-2, 0) \cup (2, +\infty) \checkmark$$

$$\text{الف) } \sqrt{\frac{x-2}{x^4 - 2x^2 - 1}} \rightarrow \frac{x-2}{x^4 - 2x^2 - 1} \geq 0 \quad D_y = (-2, 2) \cup (2, +\infty) \checkmark$$

$$x^4 - 2x^2 - 1 = 0 \rightarrow t^2 - 2t - 1 = 0 \quad (t-4)(t+2) = 0 \rightarrow t = -2 \text{ و } 4 \rightarrow t = 4 = x^2 \rightarrow x = \pm 2$$

$$\text{ب) } y = \frac{2x^2 + 1}{4 - 2[-x]} \quad D_y = \mathbb{R} - \{\text{ریشه‌های } f\} \rightarrow \mathbb{R} - \{-3, -2\} \checkmark \rightarrow D_f = (-\infty, -3] \cup (-2, +\infty)$$

$$4 - 2[-x] = 0 \rightarrow 2[-x] = 4 \rightarrow [-x] = 2 \rightarrow 2 \leq -x < 3 \rightarrow -2 \geq x > -3 \quad \text{ریشه‌های } f$$

$$\text{الف) } f(x) = \frac{\sqrt{x(x^2-1)}}{\sqrt{|x|+x}} \quad x(x^2-1) \geq 0 \rightarrow \frac{-1}{-} + \frac{0}{+} + \frac{1}{+} \quad [-1, 0] \cup [1, +\infty) \quad \text{سوال (۵)}$$

(۲)

$$\sqrt{|x|+x} \rightarrow |x|+x > 0 \rightarrow |x| > -x \rightarrow (0, +\infty) \quad \text{سوال (۶)}$$

$$D_f = \text{①} \cap \text{②} = [1, +\infty) \checkmark$$

$$\text{ب) } f(x) = \frac{\sqrt{|x-2| - x^2}}{|x|-1} \quad |x-2| - x^2 \geq 0 \rightarrow |x-2| \geq x^2 \rightarrow x-2 \geq x^2 \rightarrow x^2 - x + 2 \leq 0 \quad \text{• } \Delta < 0 \text{ همیشه}$$

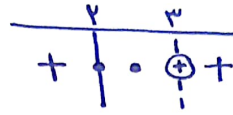
$$|x|-1 \neq 0 \rightarrow |x| \neq 1 \rightarrow x \neq \pm 1 \quad \text{①}$$

$$\text{② } [-2, 1] \leftarrow \frac{-2}{+} + \frac{1}{-} + \frac{1}{+}$$

$$\text{①} \cap \text{②} \rightarrow D_f = [-2, -1) \cup (-1, 1) \checkmark$$

$$y = \sqrt{(x-2)(x-3)} \rightarrow (x-2)(x-3) \geq 0$$

$$[x-2] = 0 \rightarrow 0 \leq x-2 < 1 \rightarrow 2 \leq x < 3$$

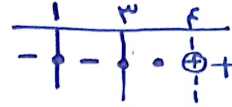


$$\rightarrow D_f = \mathbb{R} \checkmark$$

(2)

$$y = \sqrt{|x-1|(x-3)} \rightarrow |x-1|(x-3) \geq 0$$

$$[x-3] = 0 \rightarrow 0 \leq x-3 < 1 \rightarrow 3 \leq x < 4$$



$$D_f = [3, 4) \cup \{1\} \checkmark$$

$$g = \frac{1}{|x-2|-1} - k \rightarrow D = \mathbb{R} - \{\text{ریشه مخرج}\} \rightarrow \mathbb{R} - \{0, 2, 4\}$$

باید از مخرج صفر نشود $\rightarrow k \geq 0$

$$|x-2|-1 = k \rightarrow |x-2| = k+1$$

$$|x-2|-1 = -k \rightarrow |x-2| = 1-k$$

$$\begin{aligned} |x-2| = k+1 &\rightarrow x = k+3 \rightarrow 4 \\ &\rightarrow x = -k+1 \rightarrow 0 \\ |x-2| = 1-k &\rightarrow x = 3-k \rightarrow 2 \\ &\rightarrow x = k+1 \rightarrow 2 \end{aligned}$$

چون دامنه تنها شامل 3 عدد نیست پس دوتا از شاخه ها باید با هم برابر باشند

(2)

$$\begin{aligned} \rightarrow k+3 &= -k+1 \rightarrow k = -1 \text{ غلط} \\ \rightarrow 3-k &= k+1 \rightarrow k = 1 \text{ غلط} \\ \rightarrow -k+1 &= 3-k \rightarrow 1 = 3 \text{ غلط} \\ \rightarrow k+1 &= k+3 \rightarrow 1 = 3 \text{ غلط} \end{aligned}$$

کافی تواند صفر باشد چون در آن صورت دامنه تنها شامل 2 عدد نمی شود

$$D = \mathbb{R} - \{\text{ریشه مخرج}\}$$

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

$$\begin{aligned} ① \quad x-1 &\neq 0 \rightarrow x \neq 1 \\ ② \quad \frac{x+1}{x-1} &\neq 0 \rightarrow x \neq -1 \\ ③ \quad x^2+3x+2 &\neq 0 \rightarrow x \neq -1, -2 \end{aligned}$$

$$\left. \begin{aligned} ① \\ ② \\ ③ \end{aligned} \right\} x = 3 \checkmark$$

(2)

$$x^2 - 2xn + 3n = 0 \rightarrow x^2 - 4x + 9 = 0 \rightarrow (x-3)^2 = 0 \rightarrow x = 3 \checkmark$$

$$y = \log_{n+1} \log_n \frac{x}{x+1}$$

$$\begin{aligned} x+1 &> 0 \rightarrow x > -1 \\ x+1 &\neq 1 \rightarrow x \neq 0 \end{aligned}$$

$$\left. \begin{aligned} x > 0 \\ x \neq 1 \end{aligned} \right\} ②$$

$$-\log_n^2 > 0 \rightarrow \log_n^2 < 0 \rightarrow 0 < x < 1 \quad ③$$

$$D_f = ① \cap ② \cap ③ \Rightarrow (0, 1) \checkmark$$

(2)

$$-5 \leq 3x^2 - 1 \leq 3 \rightarrow -1 \leq 3x^2 - 1 \leq 3 \rightarrow 0 \leq 3x^2 \leq 4 \rightarrow 0 \leq x^2 \leq \frac{4}{3}$$

به چپ کمترین مقدار $3x^2$ مساوی صفر است پس کمترین مقدار $3x^2 - 1$ برابر -1 است

$$\rightarrow -\frac{2}{\sqrt{3}} \leq x \leq \frac{2}{\sqrt{3}}$$

$$D = \left[-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right] \checkmark$$

(2)