

برای حل



۱۹،۵ آزمون

در این صورت

$$\begin{aligned} f(x) &= \sqrt{x+f\sqrt{x-f}} \\ g(x) &= \sqrt{x-f\sqrt{x-f}} \end{aligned} \quad \left\{ \begin{array}{l} x > f \\ x = f \end{array} \right. \quad \begin{array}{l} \xrightarrow{x=f} \sqrt{f+f\sqrt{f-f}} = \sqrt{f} = f \\ \xrightarrow{x=f} \sqrt{f-f\sqrt{f-f}} = 0 \end{array} \quad \begin{array}{l} f+0=f \\ f+0=f \end{array}$$

$$\hookrightarrow \sqrt{x+f\sqrt{x-f}} - f + f + \sqrt{x-f\sqrt{x-f}} + f \Rightarrow \sqrt{(\sqrt{x-f}+f)^2} + \sqrt{(\sqrt{x-f}-f)^2} = 2$$

$$\sqrt{x-f} + f + \sqrt{x-f} - f \Rightarrow 2\sqrt{x-f} = 2 \quad \frac{f+0}{-f} = -\frac{1}{f} \quad \text{پ}$$

$$g(x) = \{(2,1), (1,0), (2,0), (0,2)\} \quad f(x) = \frac{x+f}{x^2-fx+f}$$

$$f(x) = \{(2,-2), (1,0), (2,0), (0,2)\}$$

$$\frac{g}{f} \Rightarrow \{(2, \frac{1}{-2}), (0, \frac{2}{2})\}$$

$$\begin{aligned} g(x) &= (-2, 2), (1, -1), (2, 2), (-1, 0) \\ f(x) &= (1, 2), (2, -1), (2, 2), (-1, 2) \end{aligned}$$

$$f(g(x)) \Rightarrow \{(-\frac{1}{2}, 2), (\frac{2}{2}, -1), (2, 2), (\frac{2}{2}, 2)\}$$

$$b) f(x^2) \Rightarrow \{(1, 2), (\sqrt{2}, -1), (2, 2), (\sqrt{2}, 2), (-2, 2), (-\sqrt{2}, -1), (-1, 2)\}$$

$$c) g^2(x) + 1 \Rightarrow \{(-2, 1), (1, 3), (2, 1), (-1, 1)\}$$

$$d) \frac{f}{g} \Rightarrow \{(1, -2), (2, -1), (-1, 2), (\frac{2}{2}, 2)\}$$

$$\begin{aligned} f(x) &= \{(2,1), (2,1), (2,1), (-2,0)\} \\ g &= \{(0,1), (2,2), (-2,2), (-1,2), (2,2)\} \end{aligned}$$

$$h = fg \rightarrow \{(2,0), (2,0), (-2,2)\}$$

$$\left(\frac{f}{g+1}\right)(x) \quad Dg = \mathbb{R} \quad g(x) = x^3 - x \quad f(x) = \frac{\sqrt{3x} - x}{x-2}$$

$$n \in \mathbb{Z} \quad g(n) + 1 \neq 0 \rightarrow g(n) \neq -1$$

$$Df = (0, 2) \cup (2, 3)$$

$$D\frac{f}{g+1} = \{0, 2, 3\}$$

$$\begin{aligned} x &\neq 2 \\ 3x &> 0 \\ x &> 0 \end{aligned}$$

$$= \left\{ \begin{array}{l} \text{مخرج صفر نشود} \\ \text{مخرج مثبت باشد} \end{array} \right.$$

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باید مخرج مثبت باشد مخرج صفر نشود!

$$\begin{aligned} \sqrt{3x} - x &\geq 0 \\ \sqrt{3x} &\geq x \rightarrow 3x - x^2 > 0 \quad 0 < x \Rightarrow [0, 3] \\ x(3-x) &> 0 \quad -|+|- \end{aligned}$$

$$h(x) = \frac{f(x)}{g(x)}$$

$$g(x) = \{(1,2), (2,2), (2,2), (0,1)\}$$

$$f(x) = \sqrt{3x - x^2 - 2}$$

$$\hookrightarrow \{(1, \frac{2}{2}), (2, \frac{2}{2}), (2, \frac{2}{2})\}$$

$$f(x) = \{(1,0), (2, \sqrt{2}), (2,0), (0, \sqrt{2})\}$$

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

$$\sqrt[3]{y-1} = x-1$$

$$x = \sqrt[3]{y-1} + 1 \rightarrow \mathbb{R}$$

$$\text{ب) } y = \frac{1}{x^2 - 2x} \Rightarrow x^2 - 2x = 1$$

$$x^2 - 2x - 1 = 0 \rightarrow \Delta = 4 + 4 = 8 > 0 \Rightarrow y(y+1) > 0 \Rightarrow y < -1 \text{ or } y > 1$$

$$\Rightarrow \mathcal{R} = (-\infty, -1] \cup [1, +\infty)$$

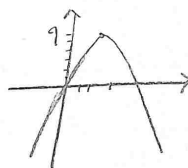
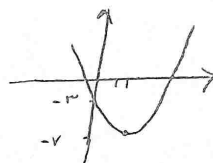
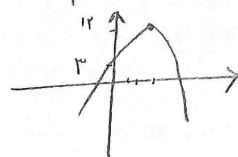
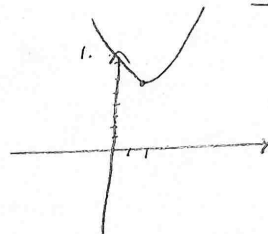
$$x = \frac{2 \pm \sqrt{4 + 4y}}{2} \quad y \neq 0$$

$$\text{الف) } y = x^2 - 2x + 1 \rightarrow \min \left| \frac{-b}{2a} = \frac{1}{1} = 1 \right|$$

$$\mathcal{R} = [1, +\infty)$$

$$\text{ب) } y = -x^2 + 4x + 1 \rightarrow \max \left| \frac{-b}{2a} = \frac{-4}{-2} = 2 \right|$$

$$\mathcal{R} = (-\infty, 2]$$



آنین به ای شکل

$$\text{ج) } y = \sqrt{x^2 - 4x + 4} \rightarrow \min \left| \frac{-b}{2a} = \frac{2}{1} = 2 \right|$$

$$\mathcal{R} = \sqrt{[-2, +\infty)} \Rightarrow [0, +\infty)$$

$$\text{د) } y = \sqrt{4x - x^2} \Rightarrow \max \left| \frac{-b}{2a} = \frac{2}{-1} = -2 \right|$$

$$\mathcal{R} = \sqrt{[-2, 2]} \Rightarrow [0, 2]$$

$$\text{الف) } y = x^3 - 3x^2 + 3x + 1 \rightarrow \mathbb{R}$$

$$\text{ب) } y = x^3 - 4x^2 + 3x + 1 \rightarrow \mathbb{R}$$

$$\text{ج) } y = \sqrt{x^3 - 3x^2 + 3x + 1} \rightarrow \sqrt{\mathbb{R}} = [0, +\infty)$$

$$\text{د) } y = (x^3 - 3x^2 + 3x + 1)^2 \rightarrow \mathbb{R}^2 \rightarrow [0, +\infty)$$

$$\text{الف) } y = \frac{x^3 + 1}{x - 1} \rightarrow \mathbb{R} \setminus \{1\}$$

$$\text{ب) } y = \frac{x^3 + 1}{x + 1} \rightarrow \mathbb{R} \setminus \{-1\}$$

$$f(n) = \frac{\sqrt{\sqrt{r}n} - n}{n - r} \rightarrow \begin{cases} n \neq r \\ n > 0 \end{cases} \quad (\sqrt{r}n) \rightarrow D_f = [0, r] - \{r\} \quad (\infty)$$

$$\begin{cases} \sqrt{r}n - n > 0 \rightarrow r n \geq n^2 \rightarrow 0 \leq n \leq r \end{cases}$$

$$g(n) + 1 \neq 0 \rightarrow g(n) \neq -1 \rightarrow [n] + [-n] \neq -1 \rightarrow n \in \mathbb{Z}$$

$$D_{\frac{f}{g+1}} = \left\{ D_f \cap D_g, g(n) \neq -1 \right\} = \{0, 1, r\}$$

$$[0, r] - \{r\} \cap \mathbb{Z}$$