

$$y = \sqrt{x^c f(x+1)} \rightarrow x^c f(x+1) \geq 0$$

$$\text{برای } \begin{cases} x^c \rightarrow 0 \\ f(x+1) = \left(\frac{1}{x}\right)^{x-1} - 1 \end{cases} \Rightarrow \frac{0}{-\frac{1}{x} + \frac{1}{x} - 1} \quad D_f: [0, 1]$$

$\left(\frac{1}{x}\right)^{x-1} \leq 1$
 $x \leq 1$

$$f(-x) = \sqrt{-x + |2-x|} \rightarrow -x + |2-x| \geq 0$$

$$\begin{cases} x \geq 2 \rightarrow x - x - 2 = -2x \\ x < 2 \rightarrow -x - x + 2 = 2 - 2x \\ \Rightarrow 2 - 2x \geq 0 \\ x \leq 1 \checkmark \Rightarrow D_f: (-\infty, 1] \end{cases}$$

$$y = \sqrt{\frac{x^{-1}}{f(x)}} \Rightarrow \frac{x^{-1}}{f(x)} \geq 0 \quad \frac{-\frac{1}{x}}{-\frac{1}{x} + \frac{1}{x} - \frac{1}{x} + \frac{1}{x} - 1}$$

$$D_f: (-\infty, 1] \cup (2, \infty)$$

$$y = \frac{1}{\sqrt{x^c - \sqrt{x^c - 2x - 5}}} = \frac{1}{-(x^c + 2x + 5) + 9x^2 - 4x^c + 1} = \frac{1}{(x^c - 1)^2 - (x + 2)^2}$$

$$\Rightarrow (x^c - 1)^2 - (x + 2)^2 \geq 0 \Rightarrow |x^c - 1| \geq |x + 2| \Rightarrow \begin{cases} x^c - 1 \geq x + 2 \\ x^c - 1 \leq -(x + 2) \end{cases}$$

$$\rightarrow x = \frac{1 \pm \sqrt{c^2 + 1}}{c} = \frac{-2 \pm \sqrt{c^2 - 12}}{c} \quad \begin{matrix} a = -1 \\ b = -c \end{matrix} \Rightarrow \sqrt{-(-1-c)} = \sqrt{c}$$

باید برای x که برابر با $\sqrt{c}$ باشد، c را در x قرار دهیم.

$$y = \sqrt{f(x) - f\left(\frac{x}{2}\right)} \xrightarrow{x \neq 0} x^c + x - \frac{4x}{x^c} - \frac{2}{x} \geq 0 \Rightarrow (x - \frac{2}{x})(x^c + x + \frac{14}{x^c}) + (x - \frac{2}{x}) \geq 0$$

فصل و فصلون

$$\Rightarrow (x - \frac{2}{x}) \left(x^c + x + 1 + \frac{14}{x^c} \right) \geq 0 \Rightarrow x - \frac{2}{x} \geq 0 \Rightarrow \frac{x^c - 2}{x} \geq 0$$

ناقصه

$$\frac{(x-2)(x^c+1)}{x} \geq 0 \Rightarrow \frac{-2}{-\frac{1}{x} + \frac{1}{x} - \frac{1}{x} + \frac{1}{x} - 1}$$

$$y \geq 0 \Rightarrow D_f: [-2, 0) \cup (2, +\infty)$$

$$f(x) + f(1-x) = 9$$

$$f(\sqrt{x}+1) + f(\sqrt{x}+1) = (x-1) + (x-1) = \boxed{1}$$

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$$f(x) = x^5 - 4x^2 + 1 \Rightarrow (x-1)^5 + 1 \Rightarrow f(\sqrt{x}+1) = \boxed{10}$$

$$g(x) = x^5 + 4x^2 + 1 \Rightarrow (x+1)^5 - 1 \Rightarrow g(\sqrt{x}-1) = \boxed{-10}$$

$$\Rightarrow \frac{-10}{10} = \boxed{-1}$$

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$$f(x) = \sqrt{(\sqrt{x-2}+1)^2} \Rightarrow |\sqrt{x-2}+1| \xrightarrow{x \geq 2} \sqrt{x-2}+1$$

$$g(x) = \sqrt{(\sqrt{x-2}-1)^2} \Rightarrow |\sqrt{x-2}-1|$$

$$\begin{cases} \sqrt{x-2}-1 > 0 \rightarrow \sqrt{x-2}+1 + \sqrt{x-2}-1 < 1 + \sqrt{x-2} \rightarrow a=b=1 \\ \sqrt{x-2}-1 < 0 \rightarrow \sqrt{x-2}+1 + 1 - \sqrt{x-2} = 2 \end{cases} \Rightarrow \frac{1+1}{-2} = -\frac{1}{2}$$

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$$\Rightarrow f(x) = \frac{x+1}{(x-1)(x-1)} \sim D_f: \mathbb{R} - \{1, 1\}$$

$$\begin{aligned} x=1 &\rightarrow f(x) = \frac{2}{x-1} \Rightarrow \frac{2}{x-1} = -2 \\ x=0 &\rightarrow f(x) = \frac{1}{x} \end{aligned} \Rightarrow \frac{g}{f} = \left\{ (0, 1), (1, -\frac{1}{2}) \right\}$$

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$$a) f(x) = \left\{ (-\frac{1}{2}, 1), (\frac{1}{2}, 2), (\frac{3}{4}, -1), (1, 1) \right\}$$

$$b) f(x) = \left\{ (1, 1), (-1, 1), (\sqrt{2}, -1), (-\sqrt{2}, -1), (1, 1), (-1, 1) \right\}$$

$$c) g(x) = \left\{ (-1, 1), (-1, 1), (1, 1), (1, 1) \right\}$$

$$d) \frac{f}{g} = \left\{ (1, -2), (1, -1), (-1, -1) \right\}$$

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