

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

$$\text{با } x^x = 0 \rightarrow x = 0 \quad (1)$$

$$\left(\frac{1}{x}\right)^{x-1} - 1 = 0 \rightarrow \left(\frac{1}{x}\right)^{x-1} = 1 \Rightarrow 1-x = 0 \Rightarrow x = 1 \quad (2)$$

$$\begin{array}{c} 0 \quad 1 \\ - \quad + \quad - \end{array} \Rightarrow Df = [0, 1]$$

$$f(-x) = \sqrt{-x + |2-x|} \geq 0 \Rightarrow |2-x| \geq x \begin{cases} 2-x \geq x \rightarrow x \leq 2 \\ 2-x \leq -x \rightarrow x \geq 2 \end{cases} \Rightarrow x \leq 2$$

$$Df = (-\infty, +1]$$

$$\begin{array}{l} x-1 \rightarrow x=1 \\ f(x) \geq 0 \\ x \neq 2, 3, -1 \end{array}$$

	$x < -1$	-1	2	3
$x-1$	-	-	+	+
$f(x)$	+	+	-	-
$p(x)$	-	+	-	+

$$Df = (-1, 1] \cup (2, 3)$$

$$y = x^x \varepsilon - 4x^2 x + 1 - (x^2 + \varepsilon x + \varepsilon) = (x^2 x - 1)^2 - (x + 2)^2 = (x^2 x - 1 - x - 2)(x^2 x - 1 + x + 2)$$

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

$$y^2 = \frac{1}{x^2 x^2 + ax + b} = \frac{1}{x^2 x^2 - x - 2} \Rightarrow \begin{cases} a = -1 \\ b = -2 \end{cases} \sqrt{-(-1-2)} = \sqrt{\varepsilon} = 2$$

$$f(x) \geq f\left(\frac{\varepsilon}{x}\right) \Rightarrow x^x + \frac{4\varepsilon}{x} + \frac{\varepsilon}{x} \rightarrow x^x - \frac{4\varepsilon}{x^2} \geq \frac{\varepsilon}{x} - x$$

$$\left(x - \frac{\varepsilon}{x}\right)^2 \geq \frac{\varepsilon - x^2}{x} \rightarrow \left(x - \frac{\varepsilon}{x}\right) \left(x + \frac{\varepsilon}{x}\right) \geq \frac{\varepsilon - x^2}{x}$$

$$\left(x - \frac{\varepsilon}{x}\right) \left(x^2 + \varepsilon + \frac{14}{x}\right) \geq 0 \Rightarrow \frac{x^2 - \varepsilon}{x} \geq 0 \quad \begin{array}{c} - \quad + \quad - \quad + \\ - \quad + \quad - \quad + \end{array} \quad [-2, 0) \cup [2, +\infty)$$

$$\left. \begin{aligned} x^3 + x = 2 &\Rightarrow \boxed{x=1} \rightarrow f(1) = \textcircled{1} \\ x^3 + x = 10 &\Rightarrow \boxed{x=2} \rightarrow f(10) = \textcircled{V} \end{aligned} \right\} V+1 = \textcircled{\wedge}$$

$$f(x) = \frac{x^3 - 4x^2 + 12x - 1}{(x-1)^2 + 1} + 1$$

$$g(x) = (x+3)^3 - 27$$

$$x^3 + 9x^2 + 27x + 27$$

$$g(\sqrt[3]{V} - 3) \Rightarrow (\sqrt[3]{V} - 3 + 3)^3 - 27 = V - 27 = -20$$

$$f(\sqrt[3]{2} + 1) \Rightarrow (\sqrt[3]{2} + 1 - 1)^3 + 1 = 10$$

$$\frac{g(x)}{f(x)} = \frac{-20}{10} = \textcircled{-2}$$

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

$$g(x) = \sqrt{x - 3\sqrt{x-3} - 3} - 3 = \sqrt{\sqrt{x-3} - 3\sqrt{x-3} - 3} = \sqrt{(\sqrt{x-3} - 1)^2} = |\sqrt{x-3} - 1|$$

و غیر تو آن صفت باشد زیرا در این صفت از یک طرف و در این طرف از طرف دیگر است.

$$f(x) + g(x) = \sqrt{x-3} + 1 + \sqrt{x-3} - 1 = 2\sqrt{x-3} \quad a=0 \Rightarrow \frac{a+b}{c} = \frac{-2}{3} = \textcircled{-\frac{2}{3}}$$

$$f(x) = \frac{x+2}{(x-1)(x-3)} \rightarrow x \neq 1, 3$$

$$f(x) = \left\{ (2, -\frac{1}{2}) (0, \frac{2}{3}) \right\}$$

$$g(x) = \left\{ (2, 1) (0, \frac{1}{3}) \right\}$$

$$Df \cap Dg = \{2, 0\}$$

$$\frac{g(x)}{f(x)} = \left\{ (2, -\frac{1}{\frac{1}{2}}) (0, \frac{1}{\frac{2}{3}}) \right\} = \textcircled{\frac{1}{2}}$$

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

$$x=2 \Rightarrow \frac{1}{x} = \frac{1}{2}$$

$$x=3 \Rightarrow \frac{1}{x} = \frac{1}{3}$$

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

$$f(x^2) \Rightarrow x^2=1 \Rightarrow x=\pm 1$$

$$x^2=4 \Rightarrow x=\pm 2$$

$$x^2=9 \Rightarrow x=\pm 3$$

$$x^2=-1 \Rightarrow \left\{ (1, 2) (-1, 2) (\sqrt{3}, 1) (-\sqrt{3}, 1) (2, 3) (-2, 3) \right\}$$

$$f(x^2) + 1 \Rightarrow \left\{ (-2, 14) (1, 3) (3, 9) (-1, 1) \right\} \Rightarrow Df \cap Dg = \{1, -1, 3\}$$

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