

$$f(x) = \left(\frac{1}{x}\right)^{x-2} - 1 \rightarrow f(x+1) = \left(\frac{1}{x+1}\right)^{x-1} - 1 \rightarrow \frac{1}{x^x} - 1$$

$$\sqrt{x} \times \left(\frac{1}{x}\right)^{x-1} \geq 0 \rightarrow \frac{1}{x} + \frac{1}{x} - 1 \geq 0 \rightarrow D_f = [0, 1]$$

$x=0 \rightarrow 0-1=-1 \rightarrow x=1$

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$$f(x) = \sqrt{x+2x+1} \rightarrow f(-x) = \sqrt{-x+|2-x|} \geq 0 \rightarrow |2-x| \geq x$$

$$f(x) = \begin{cases} x \geq 2 \rightarrow x-2 \geq x - X \\ x \leq 2 \rightarrow 2-x \geq x \rightarrow 2 \leq 2x \rightarrow x \leq 1 \end{cases}$$

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$$\textcircled{1} \cap \textcircled{2} = (-\infty, 1]$$

$$y = \sqrt{\frac{x-1}{f(x)}} \geq 0 \rightarrow x-1 \geq 0 \rightarrow x \geq 1$$

$$f(x) = 0 \rightarrow x = 2, 3, 4 \rightarrow \frac{-4}{1} + \frac{1}{1} + \frac{2}{1} + \frac{3}{1} = 0$$

توسعه داریم

$$D_f = (-4, 1] \cup (2, 3)$$

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$$y_1 = \frac{1}{9x^4 - 4x^2 - 4x + 3} \rightarrow 9x^4 - 4x^2 - 4x + 3 = 0$$

$$(9x^4 - 4x^2 + 1) - (4x + 2) = (3x^2 - 1)^2 - (2x+1)^2$$

$$(3x^2 - 1)^2 - (2x+1)^2 = 0 \rightarrow (3x^2 - 1)^2 = (2x+1)^2 \rightarrow 3x^2 - 1 = 2x+1 \rightarrow 3x^2 - 2x - 2 = 0$$

$$3x^2 + ax + b = 3x^2 - 2x - 2 \rightarrow a = -2, b = -2 \rightarrow \sqrt{-(a+b)} = \sqrt{4} = 2$$

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$$f(x) = x^2 + x \quad y = \sqrt{f(x) - f\left(\frac{x}{2}\right)} \rightarrow f\left(\frac{x}{2}\right) = \left(\frac{x}{2}\right)^2 + \frac{x}{2} = \frac{x^2}{4} + \frac{x}{2}$$

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

$$\frac{3x^2}{4} + \frac{x}{2} \geq 0 \rightarrow (3x^2 - 4)(3x^2 + 4 + 6x + 2) \geq 0 \rightarrow \frac{3x^2 - 4}{3x^2} \geq 0$$

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$$-4 \quad 0 \quad 2$$

$$- \quad + \quad - \quad + \rightarrow D_f = [-2, 0) \cup [2, +\infty)$$

$$f(x^2 + x) = x^2 - 1 \rightarrow f(x) = x^2 - 1 \quad x^2 + x = x \rightarrow x = 1 \rightarrow x^2 - 1 = 0$$

$$f(1) : x^2 + x = 1 \rightarrow x = 1 \rightarrow x^2 - 1 = 0$$

$$f(x) + f(1) : \underline{1 + 1 = 2}$$

$$f(x) = x^2 - 4x^2 + 12x + 1 - 12g(x) = x^2 + 9x^2 + 12x + 12 - 12$$

$$f(x) = (x-1)^2 + 1 \quad g(x) = (x+1)^2 - 12$$

$$f(\sqrt{12} + 1) = (\sqrt{12} + 1 - 1)^2 + 1 = 1 \quad g(\sqrt{12} - 1) = (\sqrt{12} - 1 + 1)^2 - 12 = -12$$

$$\frac{-12}{1} = \underline{-12}$$

$$f(x) = \left(\sqrt{x+1} \sqrt{x-1} \right) + 1 - 1 = f(x) = \sqrt{(x-1)^2 + 1} \sqrt{x-1} + 1 =$$

$$f(x) = \sqrt{(\sqrt{x-1} + 1)^2} = \sqrt{x-1} + 1 \quad g(x) = \sqrt{(x-1)^2 - 1} \sqrt{x-1} + 1 = \sqrt{(x-1)^2 - 1}$$

$$g(x) = \sqrt{x-1} - 1 \quad f(x) + g(x) = 2\sqrt{x-1} \rightarrow \begin{matrix} a=0 \\ b=1 \\ c=-1 \end{matrix} \quad \frac{a+b}{c} = \frac{0+1}{-1} = \underline{-1}$$

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

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

$$f(x) = \left((\frac{1}{1}, 1), (\frac{1}{1}, -1), (1, 1), (-\frac{1}{1}, 1) \right) \rightarrow f(x) = \left((1, 1), (-1, 1), (\sqrt{1}, -1), (-\sqrt{1}, -1) \right)$$

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

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