

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

$$\left(\frac{1}{x}\right)^{x-1} x^3 \geq 0 \quad x^3 \geq 0 \Rightarrow x \geq 0 \quad D_f = [0, +\infty)$$

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$$\sqrt{x+1} + x + 1 \geq 0 \quad -x + 1 - x + 1 \geq 0$$

$$\begin{cases} x \leq 2 \rightarrow -x + 2 - x \geq 0 & -2x + 2 \geq 0 & 2x \leq 2 & \boxed{x \leq 1} \\ x > 2 \rightarrow -x + x - 2 \geq 0 \Rightarrow -2 \geq 0 & \text{ناممکن} \end{cases}$$

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$$\begin{array}{c} \nearrow 1 \\ x-1 \\ f(x) \\ \downarrow \\ 2, 3, -4 \end{array}$$

$$\begin{array}{ccccccc} -4 & & 1 & & 2 & & 3 \\ - & + & - & + & - & + & - \end{array}$$

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

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$$9x^4 - 7x^2 - 4x - 3 \Rightarrow (3x^2 - x - 3) \underbrace{(3x^2 + x + 1)}_{\mathbb{R}}$$

$$D_{fg} = D_{f_1} \rightarrow 3x^2 - x - 3 = 3x^2 + ax + b \quad \begin{matrix} a = -1 \\ b = -3 \end{matrix} \quad \sqrt{-(a+b)} \Rightarrow \sqrt{4} = 2$$

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$$f(x) - f\left(\frac{x}{2}\right) \geq 0$$

$$\begin{cases} f(x) \geq f\left(\frac{x}{2}\right) \quad x > 0 \rightarrow x \geq 2 \\ f(x) \geq f\left(\frac{x}{2}\right) \quad x < 0 \rightarrow x \geq -2 \end{cases}$$

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

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$$\left. \begin{array}{l} 1^3 = 1 \Rightarrow f(1) \\ 1^3 + 1 = 10 \Rightarrow f(10) \end{array} \right\} \Rightarrow \left. \begin{array}{l} f(1^3 + 1) = 1(1^3) - 1 = 1 \\ f(1^3 + 1) = 1(1^3) - 1 = 1 \end{array} \right\} + \Rightarrow \wedge$$

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$$\begin{aligned} x^3 + 9x^2 + 14x &= (x+3)^3 - 27 \\ x^3 - 9x^2 + 14x &= (x-3)^3 + 1 \end{aligned}$$

$$\frac{(\sqrt[3]{x} - 3 + 3)^3 - 27}{(\sqrt[3]{x} + 3 - 3)^3 + 1} = \frac{1 - 27}{1 + 1} = \frac{-26}{2} = -13$$

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$$\begin{aligned} \sqrt{x+4} \sqrt{x-4} &= \sqrt{(\sqrt{x-4}+2)^2} = |\sqrt{x-4}+2| \xrightarrow{x \geq 4} \sqrt{x-4}+2 \\ \sqrt{x-4} \sqrt{x-4} &= \sqrt{(\sqrt{x-4}-2)^2} = |\sqrt{x-4}-2| \xrightarrow{x \geq 4} \sqrt{x-4}-2 \end{aligned}$$

$$f(x) + g(x) = 2\sqrt{x-4} = a + b\sqrt{x+c} \rightarrow a=0, b=2, c=-4 \quad \frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2}$$

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$$\frac{x+2}{x^2-5x+3} \rightarrow x \neq 1, 3 \quad \frac{g}{f} = (0, 4) \cup (2, \frac{1}{4})$$

$$\begin{aligned} f(2) &= \frac{2+2}{4-10+3} = -\frac{4}{3} \\ f(3) &= \frac{3+2}{9-15+3} = \frac{5}{0} \Rightarrow f(0) = \frac{2}{3} \\ f(1) &= \frac{1+2}{1-5+3} = \frac{3}{0} \Rightarrow \end{aligned}$$

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$$\begin{aligned} f(2x) &= \left\{ \left(\frac{1}{4}, 2 \right), \left(\frac{3}{4}, -1 \right), (2, 2), \left(-\frac{1}{4}, 4 \right) \right\} \\ f(x^2) &= \left\{ (1, 2), (\sqrt{2}, -1), (2, 2), (-\sqrt{2}, 1), (-1, 2), (-2, 2) \right\} \\ 2g^2(x)+1 &= \left\{ (-2, 19), (1, 3), (3, 9), (-1, 1) \right\} \\ \frac{2f}{g} &= \left\{ (1, -4), (3, -1) \right\} \end{aligned}$$

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