

$$f(x+1) = \left(\frac{1}{x}\right)^{x-1} \Rightarrow x^3 \times \left(\left(\frac{1}{x}\right)^{x-1} - 1\right) \geq 0$$

$$\Rightarrow x^3 \times \left(\left(x^{-1}\right)^{x-1} - 1\right) = x^3 \times (x^{-x} \times x - 1) \geq 0 \Rightarrow x < 1$$

$$\frac{0}{- \frac{1}{x} + \frac{1}{x} -} \Rightarrow Df = [0 \quad 1]$$

$$f(-x) = \begin{cases} \sqrt{-x + (x-2)} = \sqrt{-2} \propto x > 2 \\ \sqrt{-x + (-x+2)} = \sqrt{-2x+2} & x < 2 \end{cases}$$

$$\Rightarrow -2x + 2 \geq 0 \Rightarrow x \leq 1 \Rightarrow Df = (-\infty \quad 1]$$

$$\frac{x-1}{f(x)} \geq 0$$

$$\frac{-\frac{1}{x}}{-\frac{1}{x} + \frac{1}{x} - \frac{2}{x} + \frac{2}{x}} \Rightarrow Df = (-\frac{1}{x} \quad 1] \cup (2 \quad 3)$$

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

$\downarrow$
فاندر

$$\Rightarrow 3x^2 + ax + b = 3x^2 - x - 3 \Rightarrow a = -1 \quad b = -3$$

$$\Rightarrow a + b = -4 \Rightarrow \sqrt{-(a+b)} = \sqrt{4} = 2$$

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

$$\text{if } x = 2 \Rightarrow f(x) = f\left(\frac{x}{2}\right)$$

$$\text{if } x = -2 \Rightarrow f(x) = f\left(\frac{x}{2}\right)$$

بررسی درستی $\rightarrow$

$$\frac{-2 \quad -1 \quad 0 \quad 2}{+\frac{1}{x} - \frac{1}{x} + \frac{1}{x} - \frac{1}{x} +} \Rightarrow Df = (-\infty \quad -2] \cup [-1 \quad 0) \cup [2 \quad +\infty)$$

$$f(x) = f(x^3 + 1) = x - 1 = 1$$

$$f(10) = f(x^3 + 1) = 10 - 1 = 9 \Rightarrow f(x) + f(10) = 1 + 9 = 10$$

$$f(x) = x^3 - 9x^2 + 12x = (x+3)^3 - 27$$

$$g(x) = x^3 + 9x^2 + 27x = (x-3)^3 + 27$$

$$\Rightarrow \frac{g(\sqrt[3]{x} - 3)}{f(\sqrt[3]{x} + 3)} = \frac{(\sqrt[3]{x} - 3 + 3)^3 - 27}{(\sqrt[3]{x} + 3 - 3)^3 + 27} = \frac{x - 27}{x + 27} = -1$$

$$\sqrt{x+5}\sqrt{x-5} = \sqrt{(\sqrt{x-5}+2)^2} = |\sqrt{x-5}+2| = \sqrt{x-5}+2$$

$$\sqrt{x-5}\sqrt{x-5} = \sqrt{(\sqrt{x-5}-2)^2} = |\sqrt{x-5}-2| = \sqrt{x-5}-2$$

$$f(x) + g(x) = 2\sqrt{x-5} \Rightarrow a + b\sqrt{x+c} \Rightarrow a=0, b=2, c=-5$$

$$\Rightarrow \frac{a+b}{c} = \frac{0+2}{-5} = -\frac{2}{5}$$

$$f(x) = \frac{x+2}{x-1+x^2} = -1 \quad f(1) = \frac{1+2}{1-1+1} = \frac{3}{0} \text{ undefined}$$

$$f(x) = \frac{x+2}{9-12x+x^2} = 0 \Rightarrow f(0) = \frac{2}{9}$$

$$\frac{g}{f} = \left\{ \left(2, -\frac{1}{5} \right), \left(0, 6 \right) \right\}$$

$$\text{ا) } f(2x) = \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{3}{2}, -1 \right), (2, 2), \left(-\frac{1}{2}, 6 \right) \right\}$$

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

$$\text{ج) } 2g^2(x) + 1 = \left\{ (-2, 19), (1, 3), (3, 9), (-1, 1) \right\}$$

$$\text{د) } \frac{2f}{g} = \left\{ (1, -5), (3, -1) \right\}$$