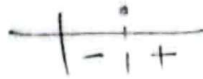


$$f(x) = \left(\frac{1}{x}\right)^{x-2} \quad \begin{cases} x^3 f(x+1) \geq 0 \\ f(x+1) = \left(\frac{1}{x}\right)^{x-1} \end{cases}$$

شماره +



$$D_f = [0, +\infty)$$

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

$$f(-x) = \begin{cases} \sqrt{-x} & x \geq 2 \\ \sqrt{-2x+2} & x < 2 \end{cases} \Rightarrow D_f = (-\infty, 1]$$

-2x+2 ≥ 0
2x ≤ 2
x ≤ 1

$$\frac{x-1}{f(x)} \geq 0 \quad \begin{array}{c} -5 \quad -4 \quad -1 \quad 2 \quad 3 \\ | \quad | \quad | \quad | \quad | \\ - \quad + \quad - \quad + \quad + \end{array}$$

(تابع از 0 تا 3)

$$D_f = (-5, 1] \cup (2, 3)$$

$$y_1 = \frac{1}{9x^5 - 7x^2 - 4x - 3} \neq 0$$

$$(9x^5 - 7x^2 + 1) - (x^2 + 2x + 2) = 0$$

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

$$\Delta < 0 \quad \text{عمودار مخالف}$$

$$3x^2 + ax + b = 3x^2 - x - 3$$

$$a = -1$$

$$b = -3$$

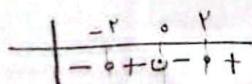
$$\sqrt{-(a+b)} = \sqrt{-(-4)} = 2$$

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

$$x^4 + x^4 - 4x^2 - 4x = t^3 + t^2 - 4t - 4 = (t-2)(t^2 + 5t + 14)$$

(x^2-2) فاقد ریشه

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



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

$x^3 + x = 2 \rightarrow x = 1 \Rightarrow f(2) = 2 - 1 = 1$ $x^3 + x = 10 \rightarrow x = 3 \Rightarrow f(10) = 10 - 1 = 9$ $f(2) + f(10) = 1 + 9 = 10$	6
$f(x) = x^3 - 4x^2 + 12x - 10 + 10 = (x-2)^3 + 10$ $g(x) = x^3 + 9x^2 + 27x + 27 - 27 = (x+3)^3 - 27$ $\frac{g(\sqrt[3]{27}-3)}{f(\sqrt[3]{27}+2)} = \frac{(\sqrt[3]{27}-3+3)^3-27}{(\sqrt[3]{27}+2-2)^3+10} = \frac{27-27}{2+10} = -2$	7
$f(x) + g(x) = \sqrt{(x-2)+2}\sqrt{x-2}+2 + \sqrt{(x-2)-2}\sqrt{x-2}+2 = \sqrt{(x-2+2)^2} + \sqrt{(x-2-2)^2}$ $= \sqrt{x-2}+2 + \sqrt{x-2}-2 \xrightarrow{x \geq 2} 2\sqrt{x-2} = a+b\sqrt{x+c}$ $\left. \begin{array}{l} a+b=2 \\ c=-2 \end{array} \right\} \frac{a+b}{c} = -\frac{1}{2}$	8
$f(2) = -2$ $f(1) = \text{تعریف نشده}$ $f(3) = \text{تعریف نشده}$ $f(0) = \frac{2}{3}$ $\frac{g}{f} = \left\{ (2, -\frac{1}{2}), (0, 4) \right\}$	9
الف) $f(2x) = \left\{ (\frac{1}{2}, 2), (\frac{3}{2}, -1), (2, 2), (-\frac{1}{2}, 4) \right\}$ ب) $f(x^2) = \left\{ (1, 2), (\sqrt{3}, -1), (2, 2) \right\}$ ج) $2g^2(x)+1 = \left\{ (-2, 19), (1, 3), (3, 9), (-1, 1) \right\}$ د) $\frac{2f}{g} = \left\{ (1, -2), (3, -1), (-1, \frac{14}{3}) \right\}$	10