

ریشه‌های معادله $f(x) = 0$ را بیابید و بررسی کنید که آیا در دامنه قرار دارند یا نه.

$$f(x) = \begin{cases} x^3 - 4 & x > 2 \\ 12x - 2 & x \leq 2 \end{cases}$$

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

$$(x-2)^2(x-2+4) \rightarrow (x-2)^2(x+2) = 0 \rightarrow x=2 \text{ یا } x=-2$$

آنها را در دامنه قرار می‌دهیم: $x=2$ در دامنه است، $x=-2$ در دامنه نیست.

$$f(1) = 12 \cdot 1 - 2 = 10$$

$$f(x) = 3x + 12 - 12 = 3x$$

$$\rightarrow f(f(x)) =$$

$$f^{-1}(1) = 1/3 \rightarrow f(1/3) = 1$$

$$3(3x - 1) - 1 = 9x - 3 - 1 = 9x - 4$$

$$A(2, 2)$$

$$f(x) = \frac{ax}{x-1}$$

$$(2, 2)$$

$$\rightarrow 2 = \frac{a \cdot 2}{2-1}$$

$$\rightarrow 2a = 2 \cdot 1 \rightarrow 2a = 2$$

$$a = 1$$

$$a(a-2) = 0$$

$$a=0 \text{ یا } a=2$$

$$a=2$$

$$f \circ f^{-1} = \{(1,1), (2,2), (3,3), (4,4)\}$$

$$f^{-1} \circ f = \{(1,1), (2,2), (3,3), (4,4)\}$$

$$f \circ g^{-1} = \{(1,1), (2,2)\}$$

$$g^{-1} \circ f = \{(1,1), (2,2), (3,3)\}$$

$$\frac{h}{f \circ g^{-1}} = \{ (1, 2) (3, 1) (4, 0) \}$$

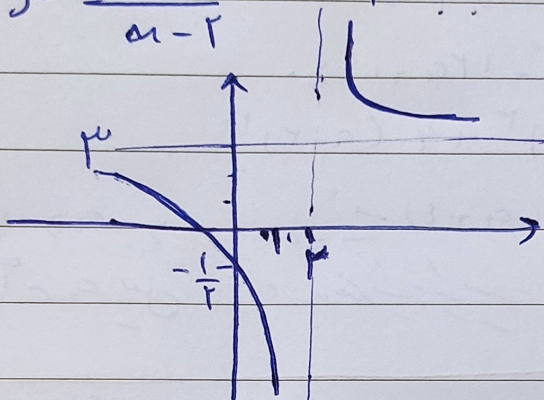
(3)

$$g = \frac{3x+1}{x-2}$$

$$\text{جانبه} = 2$$

$$\text{جانبه} = \frac{a}{c} = 3$$

(2)



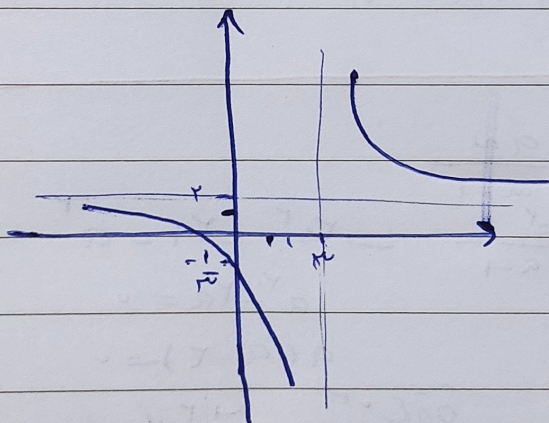
همواره یک به یک است

$$f^{-1}$$

$$\Rightarrow \frac{2x+1}{x-3}$$

$$\text{جانبه} = 3$$

$$\text{جانبه} = \frac{a}{c} = 2$$

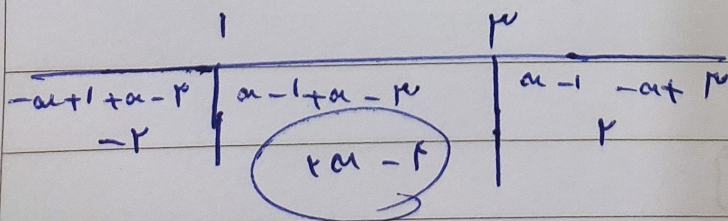


$$f(x) = |x-1| - |x-3|$$

$$[a, b] = [1, 3]$$

(✓)

$$a=1 \quad b=3$$



$$g = 2x - 4$$

$$a = 2y - 4$$

$$2y = a + 4$$

$$y = \frac{1}{2}a + 2$$

$$f(x) = \begin{cases} ax^r + r & x \geq 1 \rightarrow R = [a, +\infty) \\ ax - 1 & x \leq 0 \rightarrow R = (-\infty, -1] \end{cases} \quad \text{واردول بنیراست} \quad \textcircled{A}$$

$$y = ax^r + r \rightarrow a = \frac{y-r}{x^r} \rightarrow \sqrt[r]{\frac{y-r}{a}} = x \quad \left\{ \begin{array}{l} \sqrt[r]{\frac{y-r}{a}} \quad x \geq 1 \\ \frac{y+1}{r} \quad x \leq -1 \end{array} \right.$$

$$y = ax - 1 \rightarrow a = \frac{y+1}{x} \rightarrow x = \frac{y+1}{a}$$

$$f(x) = a^x - \frac{(a+1)^r}{a+r} \quad f^{-1}(a) = \frac{a+b}{ra+d} \quad \textcircled{A}$$

$$f^{-1}(b) = ? \quad f(x) = \frac{-rx-1}{a-r} \quad f^{-1}(a) = \frac{-ry-1}{y+r}$$

$$\frac{a^r - (a^r + r a^r + r(a+1))}{a+r} \rightarrow \frac{a^r + r a^r - a^r - r a^r - r a - 1}{a+r}$$

$$a = -1 \quad b = -1 \quad d = 1 \quad f^{-1}(-1) = \frac{-r(-1) - 1}{-1+r} = a$$

$$f(x) = \frac{a}{a^r + 1} \rightarrow a = \frac{y}{y^r + 1} \rightarrow ay^r + a = y \quad \textcircled{10}$$

$$y^r a - y + a = 0 \rightarrow \Delta = 1 - 4a^r \rightarrow y = \frac{1 \pm \sqrt{1-4a^r}}{2a^r}$$

$$D^{-1} f(x) = \left[-\frac{1}{r} + \frac{1}{r} \right] - \{0\} \Rightarrow f^{-1}(a) = \frac{1 + \sqrt{1-4a^r}}{2a^r}$$