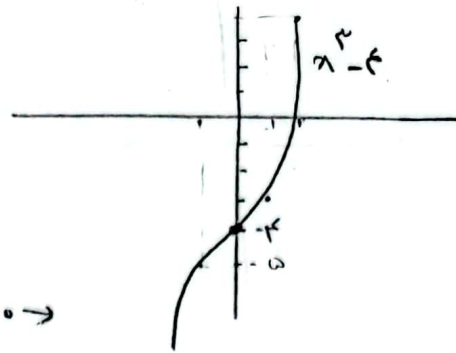


$$f(x) = \begin{cases} x^2 - 4 & ; x > a \\ 12x - 20 & ; x \leq a \end{cases}$$



$$a^2 - 4 = 12a - 20 \rightarrow a^2 - 12a + 16 = 0$$

$$(a-2)(a-8) = 0 \rightarrow (a-2)(a-8)(a+4) = 0 \rightarrow$$

$$(a-2)^2(a+4) = 0 \rightarrow \begin{cases} a=2 \\ a=-4 \end{cases}$$

$$f^{-1}(y) = x, f(x) = 2x + k, f(4) = 2 \rightarrow 2 = 2(4) + k \rightarrow k = -10 \Rightarrow$$

$$f(x) = 2x - 10, f(6) = 2(6) - 10 = 2$$

$$f(f(x)) = f(2x - 10) = 2(2x - 10) - 10 = 4x - 20 - 10 = 4x - 30$$

$$A(2a, a), f(x) = \frac{ax}{x-1}, \frac{x=a}{y=2a} \rightarrow 2a = \frac{a(a)}{a-1} \rightarrow a^2 = 2a^2 - 2a \Rightarrow a^2 - 2a = 0$$

$$a(a-2) = 0 \rightarrow \begin{cases} a=0 \\ a=2 \end{cases}$$

$$f = \{(5, 8), (4, 7), (3, 6), (2, 5)\}, g = \{(3, 2), (1, 4), (2, 5)\}$$

$$f^{-1} = \{(8, 5), (7, 4), (6, 3), (5, 2)\}, g^{-1} = \{(2, 3), (4, 1), (5, 2)\}$$

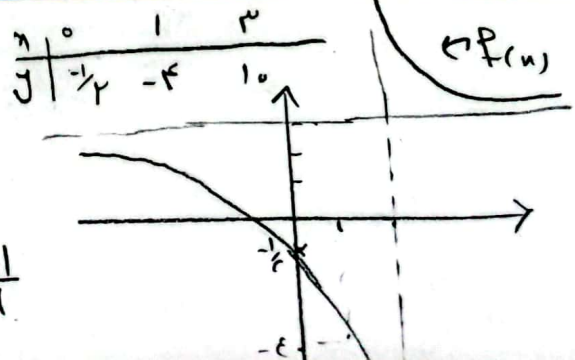
$$1) f \circ f^{-1} = \{(5, 5), (4, 4), (3, 3), (2, 2)\} \quad 2) f \circ g^{-1} = \{(2, 8), (5, 4)\}$$

$$3) f^{-1} \circ f = \{(5, 5), (4, 4), (3, 3), (2, 2)\} \quad 4) g^{-1} \circ f = \{(3, 9), (1, 7), (2, 6)\}$$

$$f = \{(2, 1), (1, 2), (4, 3)\}, g = \{(2, 1), (1, 2), (4, 3)\}, h = \{(1, 2), (2, 1), (4, 3)\}$$

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

$$y = \frac{2x+1}{x-2} \quad \text{نقطه } x-2=0 \rightarrow x=2 \quad \text{نقطه } y=3 \rightarrow \frac{2}{1} = 2 \rightarrow y=3$$

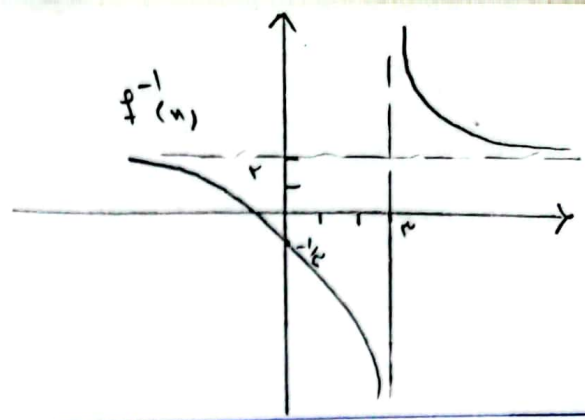


$$2x+1 = xy - 2y \rightarrow 2x - xy = -2y - 1 \quad \text{دارد منحنی}$$

$$x(2-y) = -2y - 1 \rightarrow x = \frac{-2y-1}{2-y} \rightarrow f^{-1}(y) = \frac{-2y-1}{2-y}$$

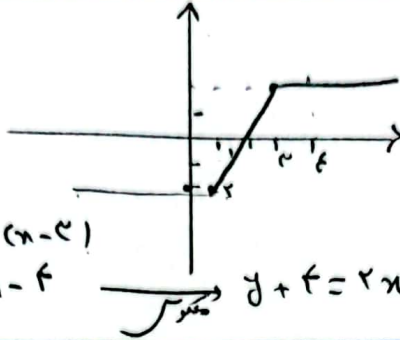
$$y = \frac{-2x-1}{-x+3} \quad \begin{array}{l} x=3: \text{نقطهٔ قائم} \\ y=2: \text{نقطهٔ افقی} \end{array}$$

x	0	2	4
y	$-\frac{1}{3}$	-5	-9



$$f(x) = |x-1| - |x-2|$$

x	0	1	2	4
y	-2	-1	2	2



$$[a, b] = [1, 2]$$

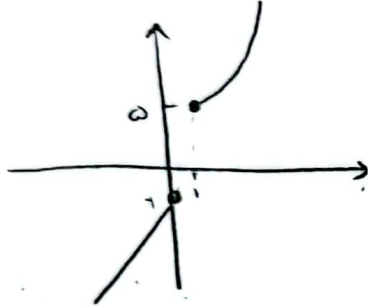
$$m = \frac{2 - (-2)}{2 - 1} = \frac{4}{1} = 4$$

$$\rightarrow y - 2 = 4(x - 2)$$

$$y = 4x - 6$$

$$y + 6 = 4x \rightarrow \frac{y+6}{4} = x \rightarrow f^{-1}(y) = x = \frac{y+6}{4}$$

$$f(x) = \begin{cases} x^3 + 4 & x \geq 1 \\ 4x - 1 & x \leq 0 \end{cases}$$



بقوهٔ به‌خود دارم من قابع وارون بنده است

$$y = x^3 + 4 \rightarrow y - 4 = x^3 \rightarrow x = \sqrt[3]{y - 4} \rightarrow f^{-1}(y) = x = \sqrt[3]{y - 4}$$

$$y = 4x - 1 \rightarrow y + 1 = 4x \rightarrow x = \frac{y+1}{4} \rightarrow f^{-1}(y) = x = \frac{y+1}{4}$$

$$f^{-1}(x) = \begin{cases} \sqrt[3]{x-4} & x \geq 5 \\ \frac{x+1}{4} & x \leq -1 \end{cases}$$

$$f(x) = x^2 - \frac{(x+1)^2}{x+3} \rightarrow y = \frac{x^2(x+3) - (x^2 + 2x + 1)}{x+3} = \frac{x^3 + 3x^2 - x^2 - 2x - 1}{x+3} = \frac{x^3 + 2x^2 - 2x - 1}{x+3}$$

$$= \frac{-1-2x}{x+3} \Rightarrow xy + 3y = -1-2x \Rightarrow xy + 3x = -1-2y \Rightarrow x(3+y) = -1-2y$$

$$x = \frac{-1-2y}{3+y} \rightarrow f^{-1}(y) = x = \frac{(-2y-1)}{(y+3)} \Rightarrow \frac{-4y-2}{2y+6}$$

$$a = -4, b = -2, d = 6$$

اگر $a+d=0$ ف در رابطه

$$f^{-1}(b) = f^{-1}(-2) = \frac{-4(-2)-2}{2(-2)+6} = \frac{12-2}{-4+6} = \frac{10}{2} = 5$$

سین $f^{-1}(x) = f(x)$

$$y = \frac{x}{x^2+1} \rightarrow yx^2 + y = x \rightarrow yx^2 - x = -y \rightarrow x - yx^2 = y \rightarrow$$

$$x(1-yx) = y \rightarrow 1-yx = \frac{y}{x} \rightarrow yx + \frac{y}{x} = 1 \rightarrow y(x + \frac{1}{x}) = 1$$

$$y = \frac{1}{x + \frac{1}{x}}$$