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$$a^3 - 12a - 10 > 0 \quad (a-2)(a+4)(a-2) > 0$$

$$a^3 - 12a + 17 > 0$$

$$\frac{a^3 - 12a + 17}{-a^2 + 4a - 4} \cdot \frac{a-2}{a^2 + 4a - 4}$$

$$\frac{2a^2 - 12a + 17}{-2a^2 + 4a}$$

$$\frac{-12a + 17}{+4a - 4}$$

$$\frac{-12a + 17}{4a - 4} > 0$$

$$a > -4$$

الف) $f(7) = 21 - 10 = 11$

ب) $f(f(x)) = f(3x - 10) = 9x - 30 - 10 = 9x - 40$

$12 + k = 2$
 $k = -10$

$f(a) = 2a$

$$\frac{a^2}{a-1} = 2a$$

$$a^2 = 2a^2 - 2a$$

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

$a=0 \quad a=2$

الف) $f \circ f^{-1} = \{(5, 5), (7, 7), (2, 2), (4, 4)\}$

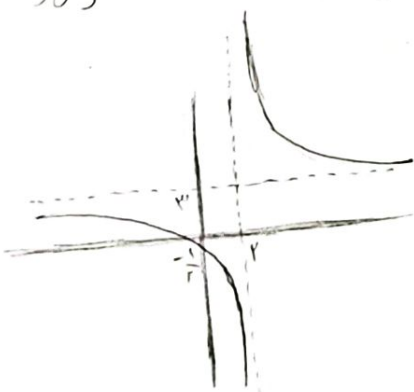
ب) $f^{-1} \circ f = \{(2, 2), (4, 4), (7, 7), (9, 9)\}$

ج) $f \circ g^{-1} = \{(2, 5), (5, 7)\}$

د) $g^{-1} \circ f = \{(3, 9), (7, 3)\}$

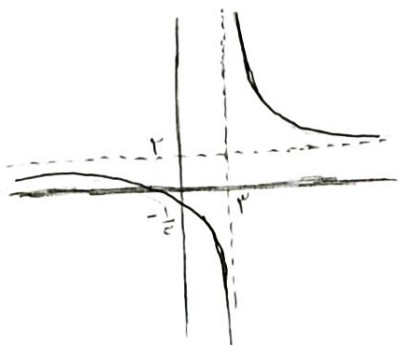
$$\frac{h}{f \circ g^{-1}} = \left\{ \left(1, \frac{1}{4}\right), \left(3, \frac{1}{4}\right) \right\}$$

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



مقلوب

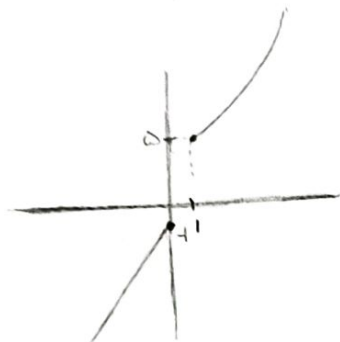
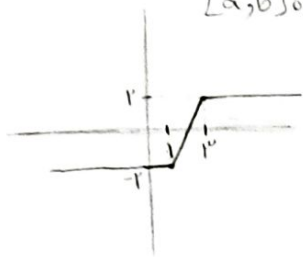
$$\frac{3y+1}{y-2} = x \quad y = -\frac{3x-1}{x-3} = \frac{3x+1}{x-3}$$



$$[a, b] \text{ بازه } f \text{ تابع } f(x) = 2x - 4 \xrightarrow{\text{عکس}} x = \frac{y+4}{2}$$

$$n = \frac{1+1}{1-1} = 1$$

$$y = \frac{x+4}{2}$$



یک به یک است

$$y = x^2 + 4 \xrightarrow{\text{عکس}} x = \sqrt{y-4}$$

$$y = 4x - 1 \xrightarrow{\text{عکس}} x = \frac{y+1}{4}$$

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

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

$$\xrightarrow{\text{عکس}} \frac{-x^2 - 2x - 1}{y+3} = x \quad y = -\frac{x^2 + 2x + 1}{x+3} = -\frac{(x+1)^2}{x+3} \quad b = -2$$

$$f^{-1}(-2) = 1$$

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

$$x^2 y + y = x$$

$$x^2 y - x + y = 0$$

$$x = \frac{1 \pm \sqrt{1-4y^2}}{2y}$$

$$\xrightarrow{\text{عکس}} y = \frac{1 \pm \sqrt{1-4x^2}}{2x}$$