

$$n^3 - 4 \geq 12n - 20 \quad n^3 - 12n + 16 = 0$$

$$= n^3 - 12n + 4n + 16 = n(n^2 - 8) + 4(n + 4) = (n+4)(n^2 - 4n + 4)$$

$$(n+4)(n-2)^2 \geq 0$$

$$n = -4, 2$$

$$a = -4$$

$$a \in [-4, +\infty)$$

$f(x) = x^3 - 4 \quad K = -10 \quad f(m) = 3m - 10$

$f(1) = 11$ ✓

$f(f(m)) = f(3m - 10) = (3m - 10)^3 - 10 = 27m^3 - 90m^2 + 120m - 100$ ✓

$f(a) = 2a = \frac{a \times a}{a - 1} = 2a \Rightarrow a^2 = 2a^2 - 2a \quad a^2 - 2a = 0$

$$a = 2, 0$$

$a = 0$ نمی تواند باشد زیرا در این صورت $f(m) = 0$ می شود و وارون پذیر نخواهد بود.

$f \circ f^{-1} = \{(5, 5), (7, 7), (9, 9), (11, 11)\}$ ✓

$f^{-1} \circ f = \{(3, 3), (4, 4), (7, 7), (9, 9)\}$ ✓

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

$g^{-1} \circ f = \{(3, 9), (7, 3), (9, 11)\}$ ✓

$D_f = \{1, 2, 3\} \Rightarrow \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} \quad \begin{matrix} 2 \\ 4 \\ 1 \end{matrix} \quad \begin{matrix} 3 \\ 1 \\ 0 \end{matrix}$

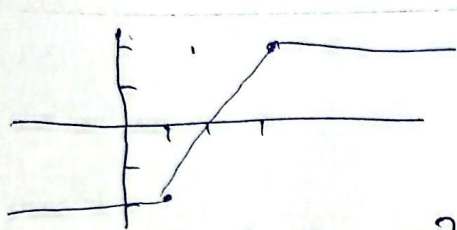
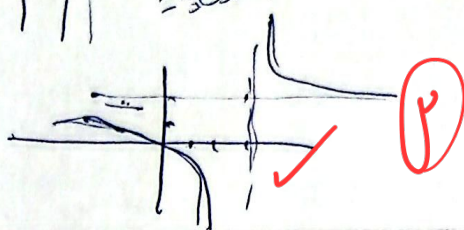
$D_{f \circ g^{-1}} = \{1, 2, 3\}$ ✓

$\frac{h}{f \circ g^{-1}} = \left\{ \frac{1}{2} \right\}$ ✓

$$y = 3 \quad x = 2$$

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

$$x = 2 \Rightarrow y = 3 \quad x = 3 \Rightarrow y = 2$$



$$x = 2, y = 3 \quad x = 3, y = 2$$

$$f(x) = \frac{x^2 + 2x + 1}{x - 3} \Rightarrow \left\{ \frac{x+1}{x-3} \mid -1 \leq x \leq 3 \right\}$$

$$f(x) = \frac{x^2 + 2x + 1}{x - 3} \Rightarrow \left\{ \begin{array}{l} x \geq 3 \\ x \leq -1 \end{array} \right\}$$

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

$$x = \frac{-y-1}{y+3} \quad b = -1 \quad a = -3 \quad d = 1 \quad f(b) = f(-1) = \frac{0}{1} = 0$$

$$y = \frac{x}{x^2 + 1} \Rightarrow \frac{y}{x^2 + 1} = \frac{x}{x^2 + 1} \Rightarrow \frac{y}{x^2 + 1} = \frac{x}{x^2 + 1} \Rightarrow x_1 x_2^2 + x_1 = x_2 x_1^2 + x_2$$

$$x_1 x_2^2 - x_2 x_1^2 + x_1 - x_2 = x_1 x_2 (x_2 - x_1) - (x_2 - x_1) = 0 \Rightarrow (x_2 - x_1) (x_1 x_2 - 1) = 0$$

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

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

$$xy^2 + x = y \rightarrow xy^2 - y + x = 0$$

$$y = \frac{1 \pm \sqrt{1 - 4x^2}}{2x} \rightarrow f^{-1}(x) = \frac{1 \pm \sqrt{1 - 4x^2}}{2x}$$

چون x و y علامه‌ها نیستند فقط

قابل قبول است.