

$$\begin{cases} x^r - r & x > a \\ 1x - r & x \leq a \end{cases}$$

$$x^k - F \gg 12x - 2$$

$$x'' - 12x + 19 \geq 0 \Rightarrow x'' - 6x - 12x + 19 \geq 0$$

$$x(x-r) - \Lambda(x-r) \geq 0 \rightarrow (x-r)^r(x+\varepsilon) \geq 0$$

$$\begin{array}{c|c} -f & r \\ \hline - & + \end{array} \rightarrow [-f, +\infty)$$

$$f(x) = 3x + k \quad f^{-1}(r) = 4 \rightarrow f(4) = r, f(x) = 3x + k \rightarrow 12 + k = r \Rightarrow k = -1.$$

$$f(y) = r(y) - 1 = 11 \checkmark, f(f(x)) \rightarrow f(rx+1), f(f(x)) = r(rx+1) - 1 \rightarrow 9x - 4 - 1 = 9x - 5 \checkmark$$

10. $f(x) = \frac{ax}{x-1}$, $A = (ra, a) \rightarrow f(a) = \frac{a^r}{a-1} = ra \rightarrow a^r = ra^r - ra \rightarrow a^r - ra = 0 \rightarrow a(a-r) = 0$

$$a=r \quad a=0$$

$$\vec{v} \vec{v} \vec{v}$$

$$x \omega = \omega$$

$$f \circ f^{-1} = a \rightarrow r \rightarrow a, v \rightarrow r \rightarrow v, r \rightarrow v \rightarrow r, q \rightarrow q \rightarrow q \Rightarrow \{ (a, a), (v, v), (r, r), (q, q) \} \quad \checkmark$$

15. $f^{-1} \circ f = r \rightarrow w \rightarrow r, r \rightarrow v \rightarrow r, v \rightarrow r \rightarrow v, a \rightarrow s \rightarrow a \Rightarrow \{(w, w), (r, r), (v, v), (a, a)\}$

$$f \circ g^{-1} = r \rightarrow r \rightarrow \omega, \varphi \rightarrow \lambda \rightarrow x, \omega \rightarrow \varphi \rightarrow \varphi \Rightarrow \{(r, \omega), (\omega, \varphi)\} \checkmark$$

$$g^{-1} \circ f = r \rightarrow a \rightarrow q, r \rightarrow v \rightarrow x, v \rightarrow r \rightarrow r, q \rightarrow r \rightarrow \wedge \Rightarrow \{(r, a), (v, r), (q, \wedge)\}$$

$$f \circ g^{-1} = 1 \rightarrow r \rightarrow \varepsilon, r \rightarrow k \rightarrow \wedge, a \rightarrow s \rightarrow o \Rightarrow \{(1, \varepsilon), (k, \wedge), (a, o)\}$$

$$20 \frac{h}{f_0 g^{-1}} = \left\{ (1, \frac{1}{\epsilon}), (r, \frac{\epsilon}{\lambda}), (\delta, \frac{1}{\lambda}) \right\}$$

$$y = \frac{rx+1}{x-r} \rightarrow r, r$$

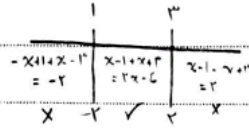
$$f^{-1}(x) = \frac{x+1}{x-1} \rightarrow r, r$$

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



$$[1, 3] \rightarrow [a, b]$$

$$x=1 \rightarrow f(x) = -2$$

$$x=3 \rightarrow f(x) = 2$$

$$a=1, b=3$$

$$f^{-1}(x) = \frac{x+2}{2} = \frac{1}{2}x + 1 \rightarrow [-2, 2]$$

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$$f(x) \begin{cases} x^2 + 1 \rightarrow x \geq 1 \\ x-1 \rightarrow x \leq 0 \end{cases} \rightarrow \begin{cases} [1, +\infty) \\ (-\infty, -1] \end{cases} \rightarrow \emptyset = \emptyset$$

$$f^{-1}(x) = \begin{cases} \sqrt{x-1}, & x \geq 1 \\ \frac{1}{x}x + \frac{1}{2}, & x \leq -1 \end{cases}$$

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

$$f^{-1}(x) = \frac{-x^3 - 1}{x+3} = \frac{-x^3 - 1}{x+3} = \frac{ax+b}{cx+d} \rightarrow \begin{cases} a = -x^3 \\ b = -1 \\ c = 1 \\ d = 3 \end{cases}$$

$$f^{-1}(b) = f^{-1}(-1) = \frac{1}{x} = 0$$

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$$f(x) = \frac{x}{x^2+1} \left\{ \begin{array}{l} \frac{x_1}{x_1^2+1} \\ \frac{x_2}{x_2^2+1} \end{array} \right\} \frac{x_2}{x_2^2+1} = \frac{x_1}{x_1^2+1} \Rightarrow x_1 x_2^2 + x_1 = x_1^2 x_2 + x_2$$

$$x_1 x_2^2 - x_1^2 x_2 + x_1 - x_2 = 0$$

$$x_1 x_2 (x_2 - x_1) - (x_1 - x_2) = 0$$

$$y = \frac{x}{x^2+1} \xrightarrow{\text{عوض متکین}} x = \frac{y}{y^2+1}$$

$$\begin{cases} x_1 = x_2 \\ x_1 x_2 = 1 \end{cases}$$

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

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چون a و y هم علامتند پس فقط $\oplus$ قابل قبول است.

$$f^{-1}(a) = \frac{1 + \sqrt{1-4a^2}}{2a}, |a| \leq \frac{1}{2}$$

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