

$$n^3 - 4; n > a$$

$$12n - 20; n \leq a$$

$$\begin{aligned} \text{صفر} \rightarrow n^3 - 4 \leq 12n - 20 \quad n > n^3 - 12n + 14 \\ (n-2)(n-2)(n+4) \end{aligned}$$

$\begin{array}{ccccccc} & & -4 & & 2 & & * \\ & & | & & | & & \\ - & & 2 & & 2 & & + \end{array}$

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

$$f(n) = 3n + 1$$

$$f(n) = 3n - 1$$

$$f(4) = 3 \times 4 + 1 = 13 \quad n > 4 = -1$$

$$f(7) = 3 \times 7 - 1 = 20$$

$$f(f(n)) = 3(3n - 1) - 1 = 9n - 4$$

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$$f(n) = \frac{an}{n-1}$$

$$(a, 2a)$$

$$\begin{aligned} y = 2a \quad \left. \begin{array}{l} y = 2a \\ n = a \end{array} \right\} \quad 2a = \frac{a \times a}{a-1} \quad n > a^2 - 2a = 0 \\ a(a-2) = 0 \\ a = 0 \rightarrow \text{انکار پذیر نیست} \quad n > \boxed{a = 2} \end{aligned}$$

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

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

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

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$$(1, \frac{1}{f}) \text{ و } (3, \frac{1}{f})$$

$$\begin{aligned} h \\ f \circ g^{-1} \end{aligned} = (1, \frac{1}{f}), (3, \frac{1}{f})$$

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$f(m) = \frac{rm+1}{n-r}$  straight ✓ $y = \frac{rm+1}{n-r} \Rightarrow m = \frac{ry+1}{y-r}$	$ny - rm = ry + 1$ $ny - ry = rm + 1$ $y(n-r) = rm + 1$ $y = \frac{rm+1}{n-r}$	6
$f(m) = m-1 - (m-r)$ abs ✓  $[1, r]$ abs $\Rightarrow rm - r \Rightarrow y = rm - r$ $m = ry - r$ $[1, r], [r, b]$ abs $\Rightarrow a=1, b=r$	$Df = [-r, r]$ $y = \frac{r+1}{r}$	7
$ny + r < m \geq 1 \rightarrow (a) + \min$ $rm - 1 < m \leq \rightarrow (-1) - \max$ $y = rm + r \quad y = rm - 1$ $m = ry + r \quad m = ry - 1$ $y = r\sqrt{m-r} \quad y = \frac{m+1}{r}$	abs ✓ $O_{\text{side}} = \sqrt{m-r} ; [a, +\infty)$ $\frac{m+1}{r} ; (-\infty, -1]$	8
$y = \frac{m^r - (m+1)^r}{m+r} \Rightarrow \frac{m^r + rm^r - m^r - rm^r - rm - 1}{m+r} = \frac{-rm-1}{m+r}$ $\frac{-rm-1}{m+r} = y$ $m = \frac{-ry-1}{y+r}$ $ny + ry = -rm - 1$ $y = \frac{-rm-1}{m+r}$	$\frac{-rm-1}{m+r} = \frac{am+b}{rm+d} \Rightarrow a=-r$ $b=-1$ $f^{-1} = \frac{-r(-r)-1}{(-r)+r} = \textcircled{A}$	9
$f(m) = \frac{m}{m^r+1}$ $m = \frac{y}{y^r+1}$ $ny^r + m - y = 0$ $\frac{-b \pm \sqrt{\Delta}}{2a}$	$f^{-1}(m) = \frac{1 \pm \sqrt{1-rm^r}}{rm}$ $m \leq \frac{1}{r}$ $f^{-1}(m) = \frac{1 + \sqrt{1-rm^r}}{rm}$	10