

$$f(n) = \begin{cases} n^3 - \epsilon & n > a \text{ صحیح عددی} \\ 12n - 2 & n \leq a \text{ صحیح عددی} \end{cases}$$

$$f(a) = 12a - 2 \rightarrow 12a - 2 < a^3 - \epsilon \rightarrow a^3 - \epsilon - 12a + 2 > 0$$

$$f(a) = a^3 - \epsilon \rightarrow a^3 - 12a + 14 > 0$$

a	0	1	2	3	4	5
	14	4	0	7	22	37

$$a = 2 \rightarrow 0$$

$$a \neq 2 \text{ صحت دی} \rightarrow a = 2 \text{ صحیح عددی}$$

$$\underline{a > 2}$$

سوال 2

$$f(n) = 2n + K \rightarrow f(\epsilon) = 2(\epsilon) + K \rightarrow 12 + K = 2 \rightarrow K = -10$$

$$f^{-1}(2) = \epsilon \rightarrow f(\epsilon) = 2$$

$$a) f(v) = ? \quad f(v) - 10 = 21 - 10 = 11$$

$$b) f(f(n)) = ? \quad f(f(n)) - 10 = 2(2n - 10) - 10 = 4n - 20 - 10 = 4n - 30$$

سوال 3

$$A(n, a)$$

$$f(n) = \frac{an}{n-1} \rightarrow f(a) = 2a \rightarrow f(a) = \frac{a \times a}{a-1} = \frac{a^2}{a-1}$$

$$a = ?$$

$$\frac{a^2}{a-1} = 2a \rightarrow a^2 = 2a(a-1) \rightarrow a^2 = 2a^2 - 2a$$

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

سوال 4

$$f = \{(r, \Delta), (\epsilon, v), (u, r), (q, q)\}$$

$$g = \{(r, r), (u, q), (q, \Delta)\}$$

$$f \circ f^{-1} \rightarrow \begin{matrix} \Delta \rightarrow r \rightarrow \Delta \\ v \rightarrow \epsilon \rightarrow v \\ r \rightarrow u \rightarrow r \\ q \rightarrow q \rightarrow q \end{matrix} \rightarrow \{(r, r), (u, u), (v, v), (q, q)\}$$

$$f^{-1} \circ f \rightarrow \begin{matrix} r \rightarrow \Delta \rightarrow r \\ \epsilon \rightarrow v \rightarrow \epsilon \\ v \rightarrow r \rightarrow v \\ q \rightarrow q \rightarrow q \end{matrix} \rightarrow \{(r, r), (\epsilon, \epsilon), (v, v), (q, q)\}$$

$$f \circ g^{-1} \rightarrow \begin{array}{l} \Delta \rightarrow 9 \rightarrow 4 \\ 9 \rightarrow \Delta \rightarrow \emptyset \\ 2 \rightarrow 3 \rightarrow \Delta \end{array} \rightarrow \{(\Delta, 4), (2, \Delta)\}$$

$$g^{-1} \circ f \rightarrow \begin{array}{l} 3 \rightarrow \Delta \rightarrow 9 \\ \varepsilon \rightarrow 7 \rightarrow \emptyset \\ 7 \rightarrow 2 \rightarrow 3 \\ 9 \rightarrow 4 \rightarrow \Delta \end{array} \rightarrow \{(3, 9), (7, 3), (9, \Delta)\}$$

$$f = \{(2, \varepsilon), (\varepsilon, \Delta), (4, 0)\} \quad g = \{(2, 1), (\varepsilon, 3), (4, \Delta)\}$$

سوال پنج

$$h = \{(1, 2), (2, \varepsilon), (\varepsilon, 1), (\Delta, 1)\}$$

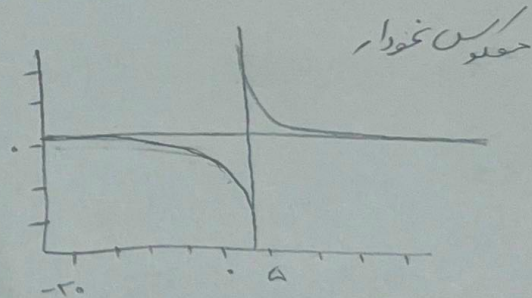
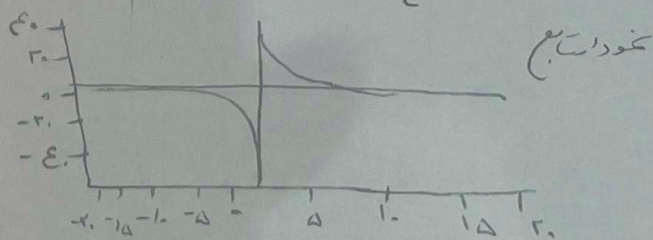
$$f \circ g^{-1} \rightarrow \begin{array}{l} 1 \rightarrow 2 \rightarrow \varepsilon \\ 2 \rightarrow \varepsilon \rightarrow \Delta \\ \Delta \rightarrow 4 \rightarrow \cdot \end{array} \rightarrow \{(1, \varepsilon), (2, \Delta), (\Delta, \cdot)\}$$

$$\frac{(1, 2), (2, \varepsilon), (\varepsilon, 1), (\Delta, 1)}{(1, \varepsilon), (2, \Delta), (\Delta, 0)} \Rightarrow \left\{ \left(1, \frac{1}{2}\right), \left(2, \frac{1}{\varepsilon}\right) \right\}$$

سوال شش

$$y = \frac{r_{m+1}}{m-r} \rightarrow \frac{r(m-r) - (r_{m+1})}{(m-r)^2} = \frac{-v}{(m-r)^2} \rightarrow f'(m) < 0$$

$$D, R = n \in \mathbb{R} - \{r\}$$



$$y(m-r) = r_{m+1} \rightarrow ym - ry = r_{m+1} \rightarrow m(y-r) \rightarrow y \neq r \rightarrow m = \frac{ry+1}{y-r}$$

$$f^{-1}(m) = \frac{r_{m+1}}{m-r} \quad m \neq r$$

$$D_{f^{-1}} = \mathbb{R} - \{r\}$$

$$R_{f^{-1}} = \mathbb{R} - \{r\}$$

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

$$[a, b]$$

$$\begin{cases} -2 & n \leq 1 \\ 2(n-2) & 1 \leq n \leq 2 \\ 2 & n \geq 2 \end{cases}$$

$$[a, b] = [1, 3] \quad \text{نقطه میانی}$$

$$b-a = 3-1 = 2$$

$$y = f(n) = 2(n-2) \rightarrow n = \frac{y}{2} + 2 \rightarrow f^{-1}(n) = \frac{n}{2} + 2 \quad n \in [-2, 2]$$

دامنه

سوال هفت

$$f(n) = \begin{cases} n^2 + 4 & n \geq 1 \\ 4n - 1 & n \leq 0 \end{cases} \rightarrow R = (-\infty, -1]$$

$$f'(n) = 2n \geq 2 \rightarrow R = [2 + \epsilon, \infty) \rightarrow [a, \infty)$$

$$(-\infty, -1] \cup [a, \infty) \rightarrow n = \frac{y+1}{4} \rightarrow n = \sqrt[4]{y-4}$$

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

$$f(-1) = -1 \quad f(1) = 5 \quad f^{-1}(-1) = -1 \quad f^{-1}(5) = 1$$

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

$$f(n) = \frac{an+b}{cn+d}$$

$$f^{-1}(b) = ? \quad (b < 0)$$

$$n = \frac{-ny-1}{y+2} \rightarrow f^{-1}(n) = \frac{-ny-1}{n+2} \rightarrow \begin{matrix} a = -2 \\ b = -1 \\ d = 2 \end{matrix}$$

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

درسته

$$f(n) = \frac{n}{n^2+1} \rightarrow y(n^2+1) = n \rightarrow yn^2+y = n \rightarrow yn^2-n+y = 0$$

$$n = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \rightarrow a = y, b = -1, c = y \rightarrow 1 \pm \sqrt{1-4y^2}$$

$$\begin{matrix} 0 & 1 & -1 \\ | & 0 & 1 \\ 0 & 1 & -1 \end{matrix}$$

$$f^{-1}(y) = \frac{1 - \sqrt{1-4y^2}}{2y} \rightarrow n = 0 \rightarrow f^{-1}(0) = 0$$

$$f^{-1}(n) = \frac{1 - \sqrt{1-4n^2}}{2n}, \quad f^{-1}(0) = 0$$