

حل بهر خود ۲ خط در نقطه ۲ است پس باید ضابطه بندی را از محل بهر خود این
 نقطه انجام دهیم که تابع یک به یک شود.

$$x^2 - 4 = 12x - 20 \rightarrow x = 2$$

$$f(4) = 3(4) + k = 2 \rightarrow k = -10$$

الف) $f(v) = \dots \rightarrow f(x) = 3x - 10 \Rightarrow f(v) = 3 \times v - 10 = 11$

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

$f(x) = \frac{ax}{x-1}$ وارون y و x جای y و x $x = \frac{ay}{y-1} \Rightarrow xy - x = ay \Rightarrow xy - ay = x \Rightarrow y(x-a) = x$

$\rightarrow y = \frac{x}{x-a} \xrightarrow{y=a} \frac{a}{x-a} \rightarrow a = \frac{2a}{2a-a} = \frac{2a}{a} = 2 \rightarrow a^2 = 2a \rightarrow a^2 - 2a = 0$

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

الف) $f \circ f^{-1} = \{(8,2), (4,0)\}$

ب) $f \circ f = \{(3,2), (4,4), (7,7), (9,9)\}$

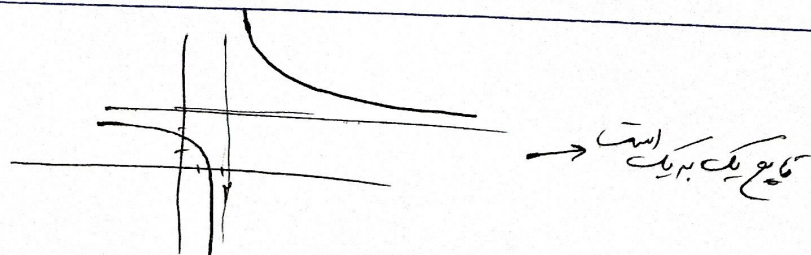
ج) $f(g^{-1}(x)) = \{(2,0)\}$

د) $g^{-1} \circ f = \{(3,9), (7,2), (9,1)\}$

$f \circ g^{-1} \rightarrow \begin{cases} 0 \rightarrow 4 \rightarrow 0 \\ 3 \rightarrow 4 \rightarrow 1 \\ 1 \rightarrow 2 \rightarrow 2 \end{cases} \Rightarrow f \circ g^{-1}(x) = \{(8,0), (3,1), (1,4)\}$

$\Rightarrow D_h \cap f \circ g^{-1} = \left\{ \frac{1}{8} \right\} \Rightarrow \frac{h}{f \circ g^{-1}} = \left\{ \left(\frac{2}{8} \right), \left(\frac{4}{1} \right), \left(\frac{1}{0} \right) \right\} \rightarrow \left\{ \frac{1}{2} \right\}$

$\frac{3n+1}{n-2} \xrightarrow{\text{همگرا می}}$

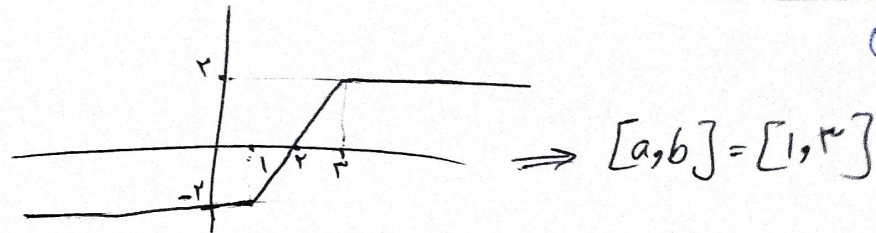


$y = \frac{3n+1}{n-2} \rightarrow n = \frac{3y+1}{y-2} \Rightarrow y = -\frac{-2n-1}{n-2} = \frac{2n+1}{n-2}$

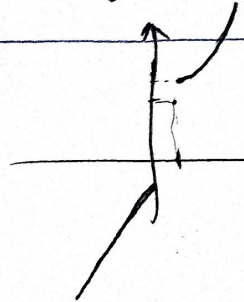
$$f(x) = |x-1| - |x-3| \xrightarrow{\text{تابع آبیاری}}$$

$$m = \frac{2 - (-2)}{3 - (1)} = \frac{4}{2} = 2$$

$$y = ax + b \rightarrow -2 = 2(1) + b \Rightarrow b = -4$$



$$\rightarrow y = 2x - 4 \xrightarrow{\text{معکوس}} x = 2y - 4 \Rightarrow x - 4 = 2y \Rightarrow y = \frac{x-4}{2}$$



تابع وارون
است زیرا یک به یک است

$$\begin{cases} y = x^2 + 4 \rightarrow x = y^2 + 4 \Rightarrow y = \sqrt{x-4} \\ y = 4x - 1 \rightarrow x = 4y - 1 \rightarrow y = \frac{x+1}{4} \end{cases} \quad (1)$$

$$\Rightarrow \begin{cases} D_f^{-1} = R_f \rightarrow (1)^2 + 4 = 5 \rightarrow y = \sqrt{x-4} ; x \geq 4 \\ D_f^{-1} = R'_f \rightarrow 4(0) - 1 = -1 \rightarrow y = \frac{x+1}{4} ; x \leq -1 \end{cases}$$

(9)

$$f(x) = \frac{x}{x^2+1} \rightarrow x = \frac{y}{y^2+1} \Rightarrow xy^2 + x = y \Rightarrow xy^2 - y + x = 0 \Rightarrow y = \frac{-(-1) \pm \sqrt{1-4x^2}}{2x}$$

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

(10)