

$$f(n) = \begin{cases} n^3 - 4 & ; n > a \\ 12n - 20 & ; n \leq a \end{cases}$$

$$n^3 - 4 \geq 12n - 20 \rightarrow n^3 - 12n + 16 \geq 0 \rightarrow (n-2)^2(n+4) \geq 0$$

در واقع بازه‌های زدن و تپیدن علامت و کم کردن کردن
نوع داده باید مثبت باشد.

$$\frac{-4}{-4+4+4} \rightarrow a = [-4, +\infty)$$

$$f(n) = 3n + k \xrightarrow{f(2)=4} f(2) = 3(2) + k = 4 \rightarrow k = -1$$

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

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

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

$$y = \frac{an}{n-1} \xrightarrow{(a,2a)} 2a = \frac{a^2}{a-1} \rightarrow 2a^2 - 2a = a^2 \rightarrow a^2 - 2a = 0$$

منفرجه قبل $\rightarrow a = 2$ و 0
 $\Rightarrow a = 2$

$$f^{-1}(n) = \{(5,2), (7,4), (9,6), (11,8)\} \quad g^{-1}(n) = \{(2,3), (4,5), (6,7), (8,9)\}$$

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

$$f^2 \circ f = \{(2,3), (4,4), (6,5), (8,6)\}$$

$$f \circ g^{-1} = \{(2,5), (4,7), (6,9), (8,11)\}$$

$$g \circ f = \{(3,5), (5,7), (7,9), (9,11)\}$$

$$\frac{h}{f \circ g^{-1}} = \{(1, \frac{1}{4}), (3, \frac{1}{1}), (5, \frac{1}{2}), (7, \frac{1}{3})\}$$

$$\Rightarrow \frac{h}{f \circ g^{-1}} = \{(1, \frac{1}{4}), (3, \frac{1}{1})\}$$

$$y = \frac{x^2+1}{x-2} \rightarrow \text{این یک دایره است و معادله آن زیر هست.}$$

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

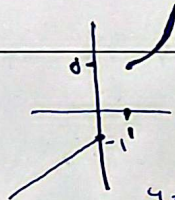
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$$f(x) = |x-1| - |x-3| \rightarrow \text{این یک دایره است و معادله آن زیر هست.}$$

$$\Rightarrow \text{این یک دایره است و معادله آن زیر هست.}$$

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$$f(x) = \begin{cases} x^2+1 & ; x > 1 \\ x-1 & ; x \leq 1 \end{cases} \Rightarrow$$



$$x^2+1 \xrightarrow{x \in \mathbb{R}} R_f = [2, +\infty)$$

$$x-1 \xrightarrow{x \in \mathbb{R}} R_f = (-\infty, 0]$$

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

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

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

$$\rightarrow y = -\frac{x^2+1}{x+2} = \frac{-x^2-1}{x+2} = \frac{a x^2+b}{x+d} \rightarrow a = -1, b = -1, d = 2 \rightarrow \frac{-x^2-1}{x+2}$$

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

$$y = \frac{x}{x^2+1} \rightarrow x = \frac{y}{y^2+1} \rightarrow x = \frac{y}{y^2+1} - y + x = 0$$

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

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