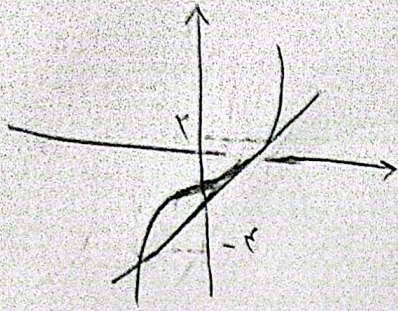


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$$a \in \mathbb{R}$$

$$n, x, y + k \Rightarrow x, y, n - k \Rightarrow y = \frac{1}{x}n - \frac{k}{x} \Rightarrow f^{-1}(n) \Rightarrow \frac{x}{x} - \frac{k}{x} \Rightarrow x \Rightarrow k = 1.$$

$$\Rightarrow f(n) = xn - 1. \quad f(v) = x(v) - 1 = 2(1) - 1 = 1$$

$$f(f(n)) = f(xn - 1) = x(xn - 1) - 1 = 9n - 2 - 1 = 9n - 3.$$

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$$n = \frac{ay}{y-1} \xrightarrow{(2a, a)} 2a = \frac{a^2}{a-1} \Rightarrow 2a^2 - 2a = a^2 \Rightarrow a^2 - 2a = 0 \Rightarrow a < 2$$

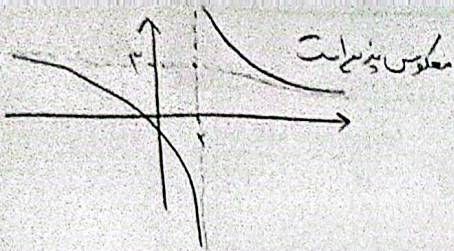
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$$f^{-1} \circ f = \{(2,2)(2,4)(4,4)(4,8)\} \quad f \circ f^{-1} = \{(2,2)(2,4)(4,2)(4,4)\} \quad \text{الف}$$

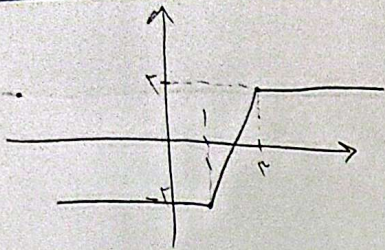
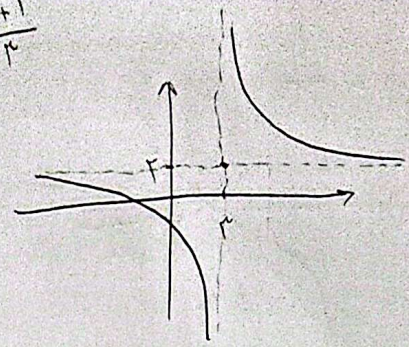
$$g^{-1} \circ f = \emptyset \quad f \circ g^{-1} = \{(2,5)(5,7)\} = f \circ g^{-1} \quad \text{ب}$$

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

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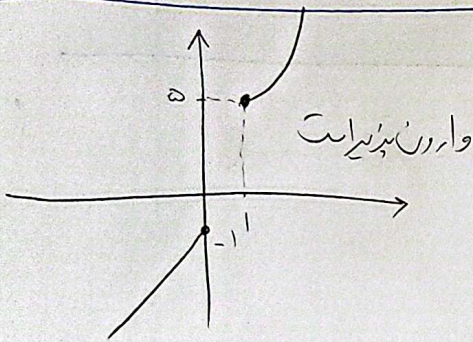


$$n = \frac{2y+1}{y-2} \Rightarrow y = \frac{2n+1}{n-2}$$



$$\begin{matrix} 1 & 2 \\ -2 & 2n-2 & 2 \end{matrix} \Rightarrow \begin{cases} a=1 \\ b=2 \end{cases}$$

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



$$n = y^2 + 2 \Rightarrow y^2 = n - 2 \Rightarrow y = \sqrt{n-2}$$

$$y \geq 1 \Rightarrow \sqrt{n-2} \geq 1 \Rightarrow n-2 \geq 1 \Rightarrow n \geq 3$$

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

$$y \leq 0 \Rightarrow \frac{n+1}{2} \leq 0 \Rightarrow n+1 \leq 0 \Rightarrow n \leq -1$$

$$\Rightarrow f^{-1}(n) = \begin{cases} \sqrt{n-2} & n \geq 3 \\ \frac{n+1}{2} & n \leq -1 \end{cases}$$

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

$$n = \frac{-2y-1}{y+2} \Rightarrow y = \frac{-2n-1}{n+2} = \frac{-2n-2}{n+2} \Rightarrow \begin{cases} a=-2 \\ b=-2 \\ d=2 \end{cases}$$

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

$$n = \frac{y}{y+1} \Rightarrow y(n+1) = y \Rightarrow y^2 n + y = y + n \Rightarrow y = \frac{1 \pm \sqrt{1-4n}}{2n}$$