

$$x^2 + 2x - 1 = 0 \Rightarrow x = \frac{-2 \pm \sqrt{4 + 4}}{2} = \frac{-2 \pm 2\sqrt{2}}{2} = -1 \pm \sqrt{2}$$

$$\omega = 2, -4, 2$$

$$L, -2, 2 \leq 2 \Rightarrow [-2, 2]$$

۱۸,۵ روی زاده

$$x^3 - 12x - 2$$

$$x^3 - 12x + 14 = 0$$

$$\Rightarrow x = 2$$

$$\begin{array}{r|l} x^3 - 12x + 14 & x - 2 \\ \hline x^3 - 2x^2 + 4x - 8 & \\ \hline 2x^2 - 8x + 22 & \\ 2x^2 - 4x + 8 & \\ \hline -4x + 14 & \\ -4x + 8 & \\ \hline 6 & \end{array}$$

$$a^2 - 4 \geq 12a - 2$$

$$(a-2)^2(a+4) \geq 0$$

$$\frac{-2}{-1} \frac{2}{+1} \frac{4}{+1}$$

$$a \in [-2, +\infty)$$

①

$$f_g: y = 3x + k = 3x - 10$$

$$f^{-1}: x = 3y + k \Rightarrow f_y = 3 \Rightarrow y = 3(x) + k \Rightarrow k = -10$$

$$f(1) = 3(1) - 10 = -7$$

$$f(x) = 3(x - 1) - 10 = 3x - 13$$

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$$f^{-1}: x = \frac{ay}{y-1} \Rightarrow xy - x = ay \Rightarrow y = \frac{-x}{x-a}$$

$$A(2a, a) \Rightarrow 2a = \frac{a(a)}{a-1} \Rightarrow \frac{a^2 - 2a^2 + 2a}{a-1} = 0 \Rightarrow \frac{2a - a^2}{a-1} = \frac{a(2-a)}{a-1}$$

$$\Rightarrow \boxed{a=0}, \boxed{a=2}$$

به دلیل صفر شدن منفرجه در تابع f و f^{-1} است
جواب نقره است و a فقط می تواند ۲ باشد

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$$f^{-1} = \{(2, 3), (7, 4), (2, 2), (6, 9)\}$$

$$g^{-1} = \{(2, 3), (2, 1), (2, 9)\}$$

$$f \circ f^{-1} = \{(2, 2), (7, 7), (2, 2), (6, 6)\}$$

$$b) f^{-1} \circ f = \{(3, 3), (4, 4), (7, 7), (9, 9)\}$$

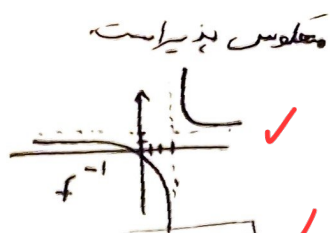
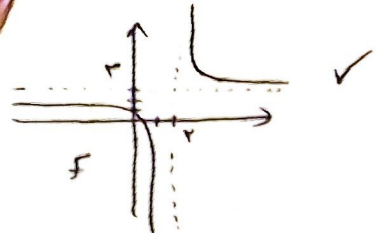
$$c) f_g^{-1} = \{(2, 2), (2, 2)\}$$

$$d) g^{-1} \circ f = \{(3, 9), (7, 3), (9, 8)\}$$

$$g^{-1} = \{(1, 2), (3, 2), (2, 4)\} \quad f \circ g^{-1} = \{(1, 4), (3, 8), (2, 2)\}$$

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

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

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ج: $x: 1 \quad 2 \quad D_f = R_{f^{-1}}$

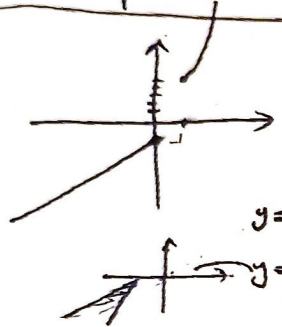
$x: 1$	$x: 2$	$x: 3$
$f(x) = \frac{1+1}{1-1} = -2$	$f(x) = \frac{2+1}{2-1} = 3$	$f(x) = \frac{3+1}{3-1} = 2$

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

$1 \leq \frac{x+1}{x-1} \leq 3 \Rightarrow -2 \leq x \leq 2$

$D_{f^{-1}} = [-2, 2]$

$$[a, b] = [1, 3]$$



لحساب

(1, 0)

$$y = \frac{x+1}{x-1} \xrightarrow{f^{-1}} x = \frac{y+1}{y-1} \Rightarrow y = \frac{x+1}{x-1}, x \leq 0$$

$$y = \frac{x+1}{x-1} \xrightarrow{f^{-1}} x = \frac{y+1}{y-1} \Rightarrow y = \frac{x+1}{x-1}, x \geq 1$$

$$f^{-1}(x) = \begin{cases} \frac{x-1}{x+1} & ; x \leq 0 \\ \frac{x+1}{x-1} & ; x \geq 1 \end{cases}$$

$x \geq 0$
 $x \leq -1$

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$$f(x) = \frac{x^2 + 3x - 1}{x+3} = \frac{-x^2 - 1}{x+3}$$

$$f^{-1} \Rightarrow x = \frac{-y-1}{y+3}$$

$$xy + 3x = -y - 1 \Rightarrow y = \frac{-(x+1)}{x+3} = \frac{ax+b}{cx+d}$$

$$\begin{cases} a = -1 \\ b = -1 \\ c = 1 \\ d = 3 \end{cases}$$

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

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

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

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

$$y(x+y-1) = 0 \Rightarrow x =$$

$$xy^2 - y = -x$$

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

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

(1, 0)

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

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

$$|x| \leq \frac{1}{2}$$

