

① چون شیب عدد + است پس رابطه ی مختلفه ی با برابر دارند

$$R_f = (-\infty, 12a - 20] \cup [a^3 - 4, +\infty)$$

$$12a - 20 \leq a^3 - 4 \rightarrow a^3 - 12a + 16 \geq 0$$

$$\begin{array}{c|c|c|c|c} & -2 & & 2 & \\ \hline & - & + & - & + \end{array}$$

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

② $f(x) = x^2 + x = 2 \Rightarrow x = -10$

$$f(x) = 21 - 10 = 11 \quad f(3n - 10) = 3(3n - 10) - 10 = 9n - 30 - 10 = 9n - 40$$

③ $f = \{(3, 5), (4, 7), (5, 2), (9, 6)\}$

$$f^{-1} = \{(5, 3), (7, 4), (2, 5), (6, 9)\}$$

$$g = \{(3, 2), (8, 4), (9, 5)\} \quad g^{-1} = \{(2, 3), (4, 8), (5, 9)\}$$

الف) $f \circ f^{-1} = \{(5, 5), (7, 7), (2, 2), (6, 6)\}$

ب) $f^{-1} \circ f = \{(3, 3), (4, 4), (5, 5), (9, 9)\}$

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

د) $g^{-1} \circ f = \{(3, 9), (4, 3), (9, 8)\}$

Subject: ()

⑤ $f(a) = \frac{a^2}{a-1} = 2a \Rightarrow a^2 = 2a^2 - 2a$
 $\Rightarrow a^2 - 2a = 0$ ✓ $f(a) = 0$ $a=0$ نمی تواند باشد زیرا در این صورت می شود و وارون پیدا نخواهد بود.
 (1/NO) $\hookrightarrow a = 2, 0$

⑥ $g^{-1} = \{(1, 2), (3, 2), (5, 4)\}$

$f \circ g^{-1} = \{(1, 2), (3, 2), (5, 0)\} \xrightarrow{f \circ g^{-1}} \frac{h}{\frac{(5, 0)}{2}} = \{(1, \frac{2}{1}), (3, \frac{2}{1}), (5, \frac{0}{2})\}$
 $\Rightarrow \{(1, \frac{2}{1}), (3, \frac{2}{1})\}$ ✓ (4)



⑦ $\frac{2y+1}{y-2} = x \Rightarrow \frac{2x+1}{x-2} = y$
 $\Rightarrow y^{-1} = \frac{2x+1}{x-2}$ ✓ (4)

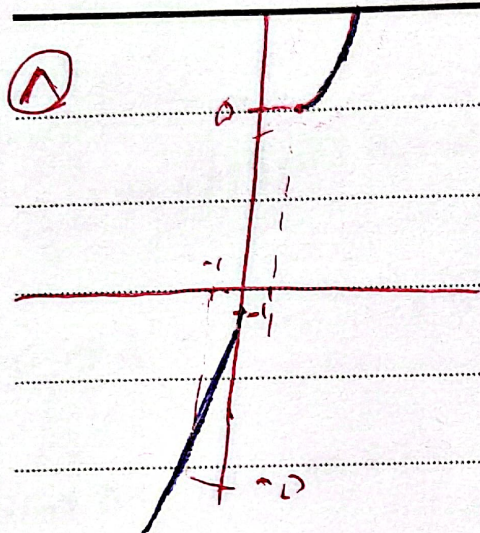
⑧

$-x+1+x-2$ (-2)	$x-1+x-2$ $2x-3$ ✓	$x-1-x+2$ (+1)
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$\hookrightarrow 2y - 3 = x \Rightarrow \frac{x+3}{2} = y$
 $\Rightarrow y^{-1} = \frac{x+3}{2}$ ✓ $-1/2 < y < 1$
 (1/NO)

Subject : ()

Date :



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

(y)

$$(4) \quad \frac{x^3 + 12x^2 - x^3 - 12x^2}{x+1} = \frac{-x-1}{x+1}$$

$$b = -1 \Rightarrow \frac{12-1}{-1+1} = \Delta$$

$$(6) \quad \frac{x}{x^2+1} = x \Rightarrow y^2 x + x = y$$

$$\Rightarrow y^2 x - y + x = 0$$

(15)

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

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

چون اگر y هم علامت پس فقط + قابل قبول است