

$$u^3 - 2 = 12u - 20$$

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

$$(u-2)(u^2+2u-7) = 0$$

$$(u-2)(u+2)(u-2) > 0$$

$$\begin{array}{r} -2 \quad 2 \\ - \quad + \quad + \\ \hline 9(7-2) \end{array}$$

$$\frac{3(x)}{12} + \frac{k}{10} = 2 \rightarrow f(x) = 12x - 10$$

الف) $f(v) = 3(v) - 10 = 11$

ب) $f(f(m)) = 3(12m - 10) - 10 = 36m - 40$

$$Rf^{-1} = DP \rightarrow \frac{a^2}{a-1} = 2a$$

$$a^2 = 2a^2 - 10a$$

$$a^2 - 2a = 0 \rightarrow a(a-2) = 0$$

عشق چون
در آتش
تافت
و سوزید
بر لب شربت

$a=2$

الف) $f \circ f = f^{-1} = \{(\omega, 3), (1, 2), (2, 1), (4, 9)\}$

$$\omega \rightarrow 3 \rightarrow \omega \rightarrow (\omega, 3)$$

$$1 \rightarrow 2 \rightarrow 1 \rightarrow (1, 2)$$

$$2 \rightarrow 1 \rightarrow 2 \rightarrow (2, 1) \quad 4, 9 \rightarrow 2 \rightarrow (4, 9)$$

ب) $\{(2, 3), (3, 4), (1, 2), (4, 9)\}$

ج) $\{(2, 3), (4, 8), (1, 2), (9, 4)\}$
 $= \{(2, 3), (4, 8), (1, 2), (9, 4)\}$

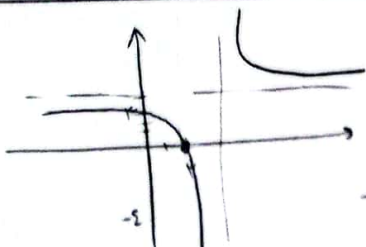
د) $\{(3, 9), (1, 2), (9, 1)\}$

$$g^{-1}(m) = \{(1, 2), (3, 4), (\omega, 4)\}$$

$$f \circ g^{-1} \rightarrow \{(1, 2), (3, 4), (\omega, 4)\}$$

$h \circ f \circ g^{-1} = D_h \cap f \circ g^{-1} = \{(1, 2), (\omega, 4)\}$

$\{(1, \frac{2}{2}), (3, \frac{4}{1}), (\omega, \frac{4}{1})\}$



$$x = \frac{1}{y} + 1$$

$$y = \frac{1}{x-1}$$

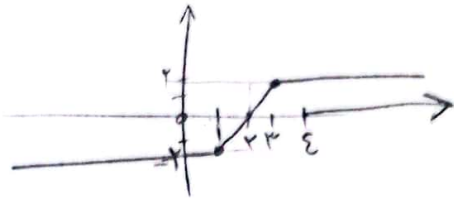
x	1	2	3	...
y	-1	-1/2	-1/3	...

$$y = \frac{1}{x-1} \Rightarrow y(x-1) = 1 \Rightarrow yx - y = 1 \Rightarrow yx = y+1 \Rightarrow x = \frac{y+1}{y}$$

$$u = \frac{1+y}{y}, f^{-1}(u) = \frac{y+1}{y}$$

$$u = \frac{1+y}{y} \Rightarrow y = \frac{1}{u-1}$$

x	1	2	3	...
y	-1	-1/2	-1/3	...



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

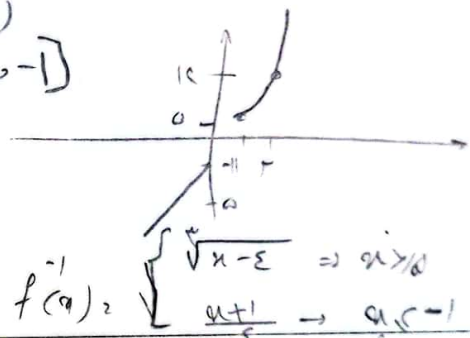
$$y - \epsilon = x \Rightarrow y = \frac{x+\epsilon}{x} \rightarrow f^{-1}(x), \frac{x+\epsilon}{x}$$

$$[a, b] \rightarrow [1, \infty)$$

$$f(x) = \begin{cases} x+1 & x > 1 \\ x-1 & x \leq 0 \end{cases} \quad R_1: [0, \infty), R_2: (-\infty, -1]$$

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

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



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

$$y(x+1) = -1-x \Rightarrow yx + y = -1-x \Rightarrow yx = -x-1-y \Rightarrow x = \frac{-x-1-y}{y+1}$$

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

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

$$f^{-1}(b) = \frac{-(-1-1)-1-y}{-1+1} = \frac{1-1-y}{0} = \frac{-y}{0}$$

$$\frac{-4x-1}{x+1} = \begin{cases} a = -4 \\ b = -1 \\ d = 1 \end{cases}$$

$$[-1, 1] \rightarrow f^{-1}(x) \text{ (not)}$$

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$$\begin{cases} yx^2 - x + y = 0 \\ \Delta = 1 - 4y^2 \end{cases}$$

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

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

مجال الدالة هو...

$$x \in \left[\frac{1}{2}, \frac{1}{2}\right]$$

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