

$$x^3 - 4 = 12x - 2 \Rightarrow x^3 - 12x + 14 = 0 \Rightarrow (x-2)^2 (x+4)$$

$$\begin{array}{c|c|c|c} -4 & 12 & 14 & \\ \hline - & + & + & \end{array}$$

$$a = [-4, +\infty)$$

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$$3K + K \xrightarrow{f(1)=4} f(4) = 3(4) + K = 2 \quad K = -10 \quad f(x) = 3x - 10 \quad \text{الف}$$

$$f(11) = 3(11) - 10 = 11 \quad f(f(x)) = 3(3x - 10) - 10 \Rightarrow 9x - 30 - 10 = 9x - 40 \quad \text{ب) ع}$$

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

$$2a = \frac{a^2}{a-1} \rightarrow 2a^2 - 2a = a^2 \Rightarrow a^2 - 2a = 0 \quad a = \frac{2}{1} \quad \text{الف}$$

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$$\text{الف) } \{ (5,5) (7,7) (2,2) (4,4) \}$$

$$\text{ج) } \{ (2,5) (5,4) \}$$

$$\text{ب) } \{ (2,3) (4,4) (7,7) (9,9) \}$$

$$\text{د) } \{ (3,9) (7,7) (9,8) \}$$

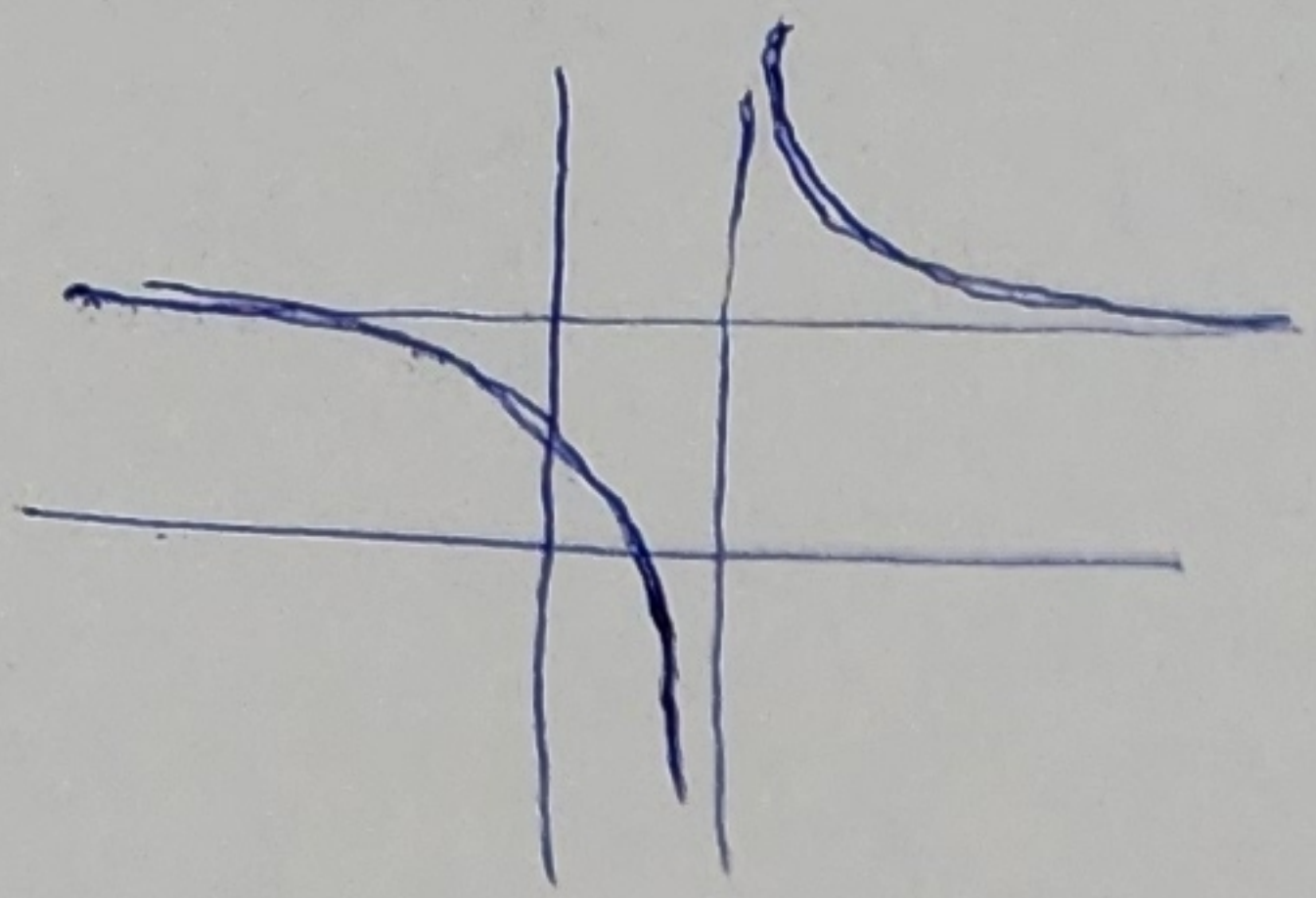
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$$\frac{h}{f \circ g^{-1}} = \{ (1, \frac{2}{4}) (3, \frac{4}{1}) (\frac{4}{2}, \frac{1}{2}) \}$$

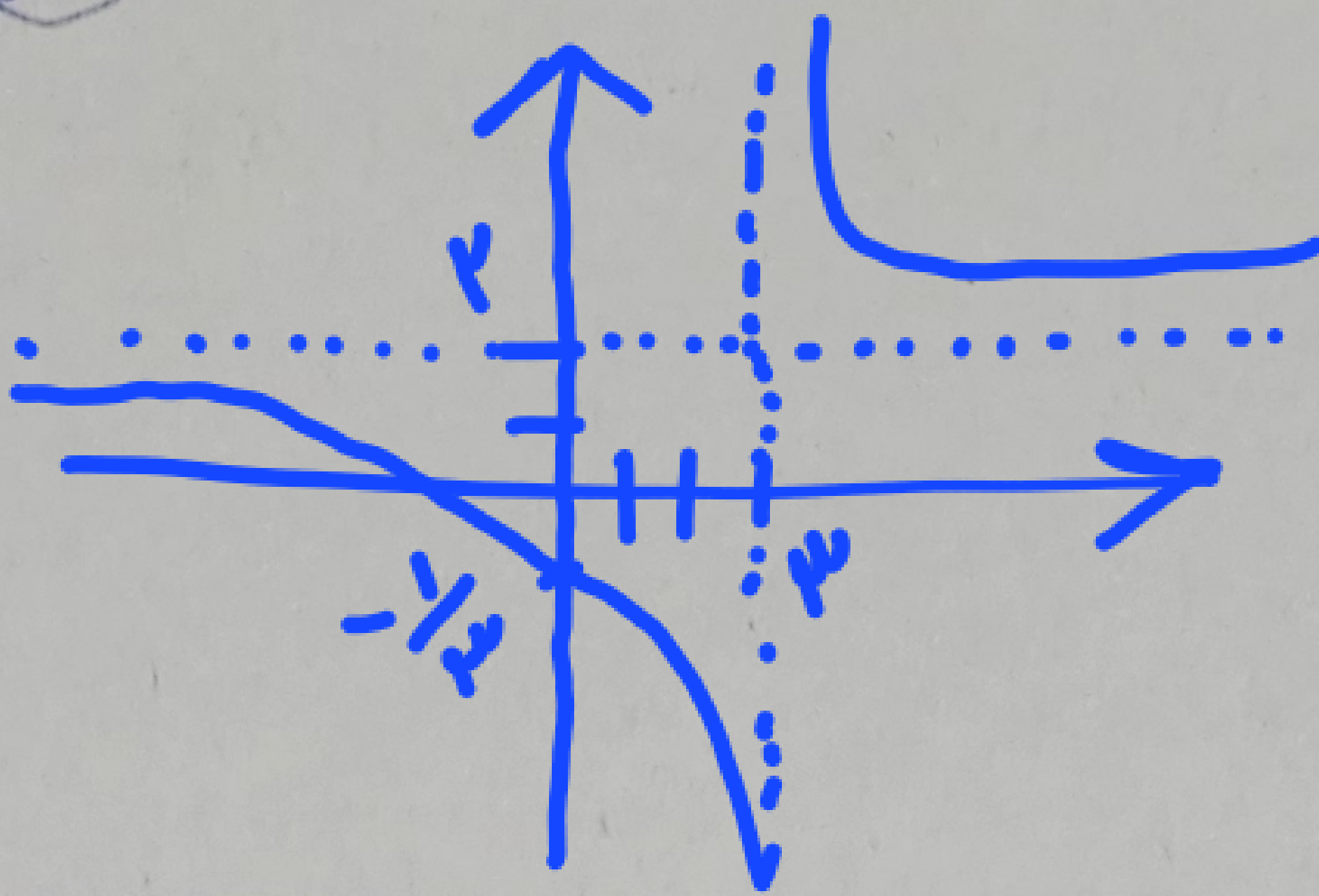
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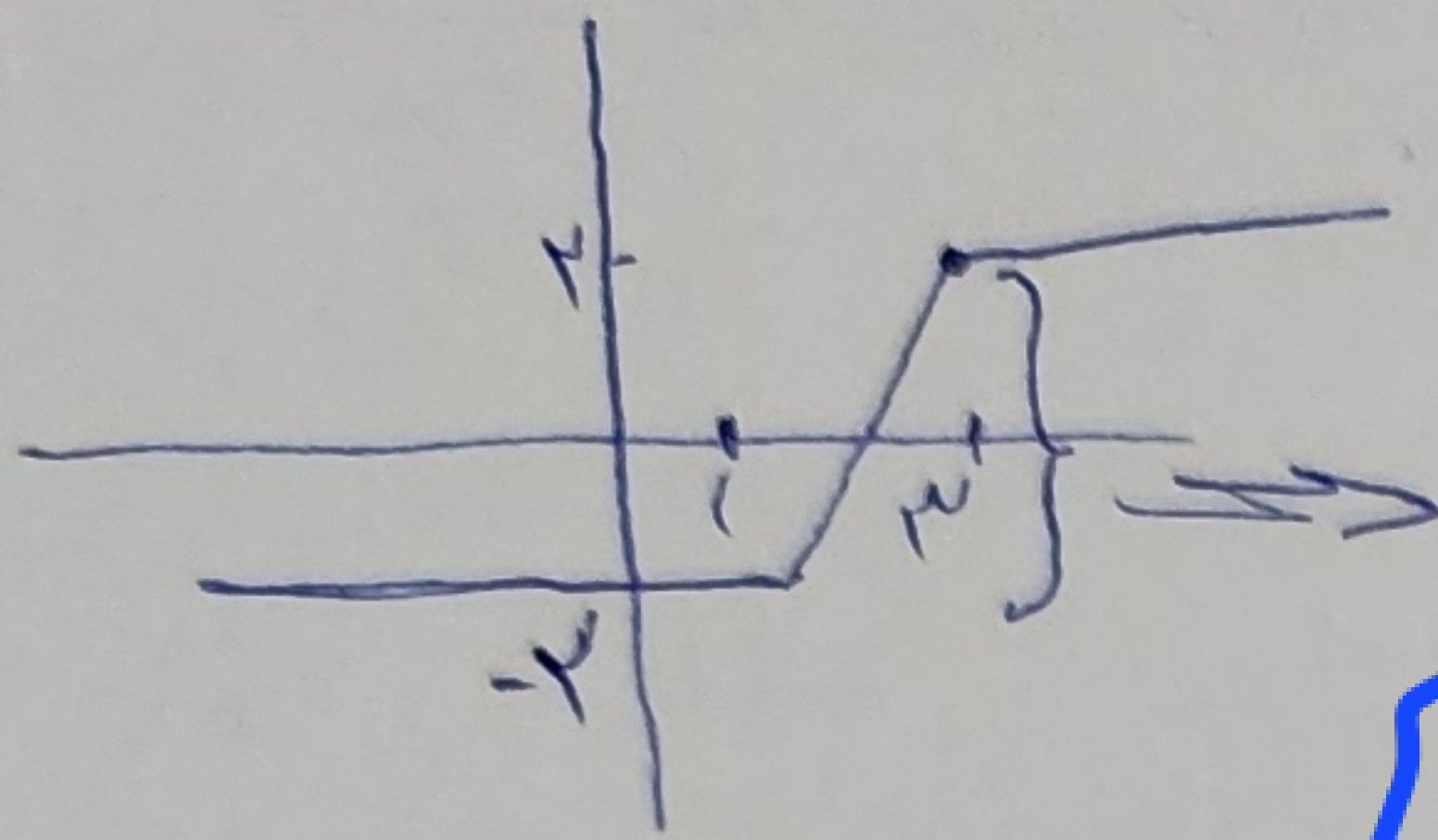
$$x = \frac{y+1}{y-2} \Rightarrow y = \frac{-2x+1}{x-2} \Rightarrow \frac{2x+1}{x-2}$$

(1,5)



مخودار معکوس تابع

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$$R_f = [-2, 2]$$

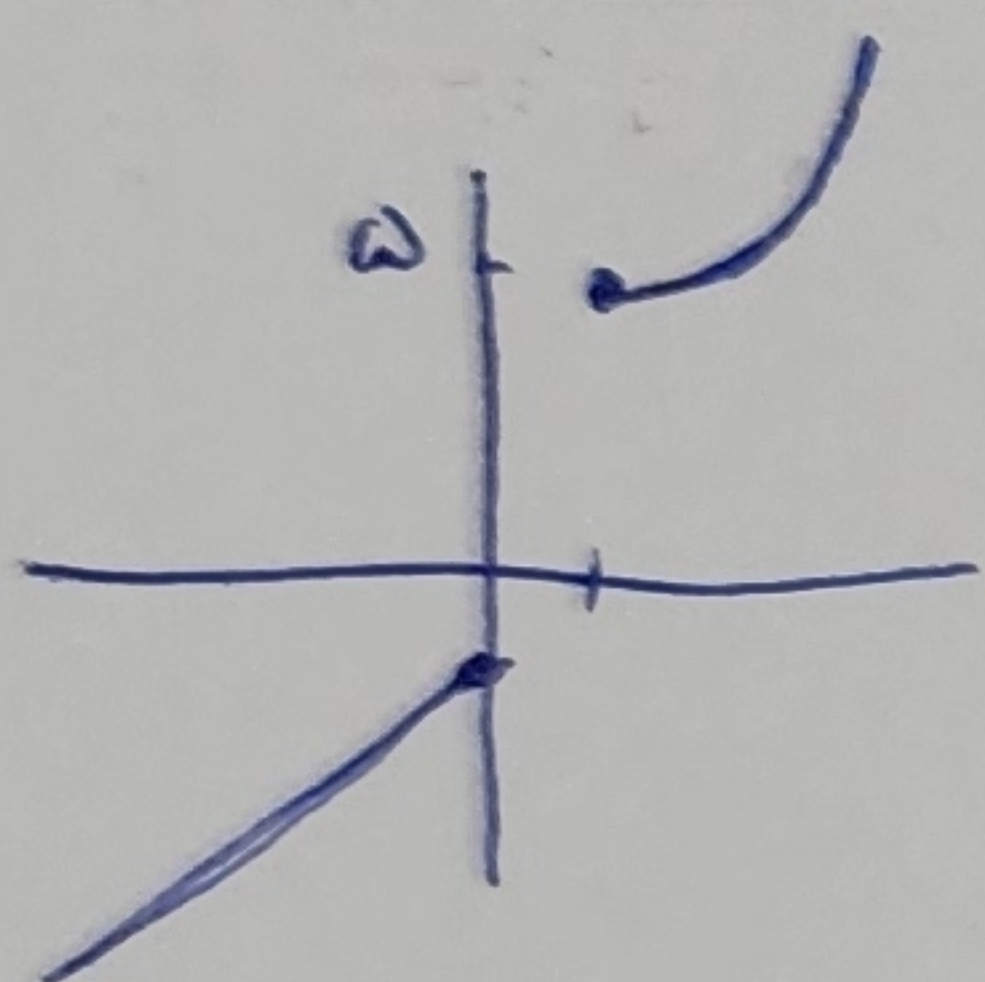
$$[a, b] \rightarrow [1, 3]$$

(2)

$$y = 2x - 4 \rightarrow x = \frac{y+4}{2}$$

$$y = \frac{x+4}{2} \quad R_f = [-2, 2]$$

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$$x+4 \rightarrow R_f x \geq 0 \Rightarrow y \Rightarrow y = \sqrt[3]{x-4}$$

$$x-1 \rightarrow R_f = x \leq -1 \Rightarrow y \Rightarrow y = \frac{x+1}{x}$$

(2)

$$f^{-1}(x) = \begin{cases} \sqrt[3]{x-4} & x \in \geq 0 \\ \frac{x+1}{x} & x \in \leq -1 \end{cases}$$

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

$$y = \frac{-2x+1}{x+3}$$

$$a = -3 \quad b = -1$$

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

$$f^{-1}(a) = \frac{-1x-1}{x+3} = \frac{-4a-2}{2x+4} \rightarrow \begin{cases} a = -4 \\ b = -1 \\ d = 4 \end{cases}$$

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(1,5) $f^{-1}(b) = f^{-1}(-1) = \frac{1}{2} = 0$

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

$$x = xy^2 - y + x \Rightarrow \frac{1 \pm \sqrt{1-4x^2}}{2x} \Rightarrow x = \frac{1 \pm \sqrt{1-4x^2}}{2x}, |x| \leq \frac{1}{2}$$

(1,5)

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