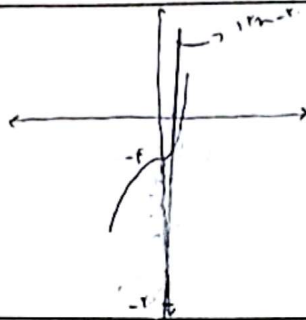


$$h(x) = \begin{cases} x^2 - \varepsilon, & x > a \\ 11x - \varepsilon, & x \leq a \end{cases}$$

$$a^2 - \varepsilon > 11a - \varepsilon$$

$$(a - \varepsilon)^2 (a + \varepsilon) > 0$$

$$a + \varepsilon > 0 \Rightarrow -a > -\varepsilon$$



۱

$$h^{-1}(r) = x \sim h(x) = r \sim h(x) = \frac{3x}{11} + k = r$$

$$\text{مثال ۱) } h(v) = 3 \times v - 1 = 11$$

$$\Rightarrow h(h(x)) = h(3x - 1) = 3(3x - 1) - 1 = 9x - 4$$

۲

$$h(x) \xrightarrow{\text{مثال}} h\left(\frac{ax}{x-1}\right) = x \xrightarrow{A(r, a)} \frac{ax}{x-1} = ra \sim a^r = ra^r - ra$$

$$\Rightarrow a^r - ra = 0 \sim a(a - r) = 0 \sim a = 0 \text{ یا } r$$

۳

$$h^{-1} \sim (0, 0) (1, 1) (2, 2) (3, 3) \quad g^{-1} \sim (1, 1) (2, 2) (3, 3) (4, 4)$$

$$\text{مثال ۱) } h \circ h^{-1} = \{(0, 0) (1, 1) (2, 2) (3, 3)\}$$

$$\text{مثال ۲) } h^{-1} \circ h = \{(1, 1) (2, 2) (3, 3) (4, 4)\}$$

$$\text{مثال ۳) } h \circ g^{-1} = \{(1, 0) (0, 1)\}$$

$$\text{مثال ۴) } g^{-1} \circ h = \{(1, 1) (2, 2) (3, 3)\}$$

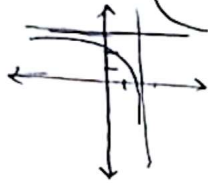
۴

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

$$\begin{array}{c} h \xrightarrow{\quad} (1, 2) (3, 4) (5, 6) \\ h \circ g^{-1} \xrightarrow{\quad} (1, 4) (3, 6) (5, 8) \end{array} \quad \begin{array}{c} (1, \frac{1}{2}) (3, \frac{1}{4}) \\ (1, \frac{1}{2}) (3, \frac{1}{4}) \end{array} \sim \frac{h}{h \circ g^{-1}} = \frac{1}{r}$$

۵

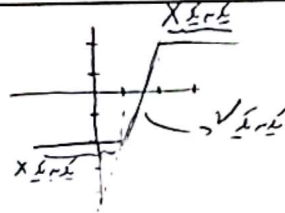
$$y = \frac{rx+1}{x-r}$$



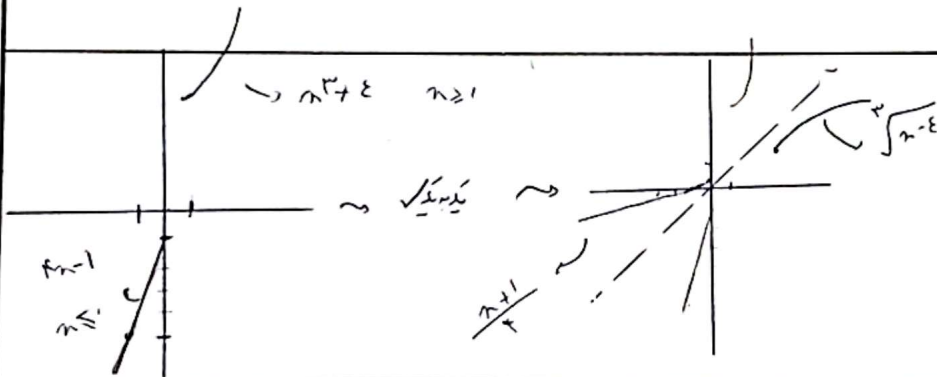
$$\sqrt{x-r} \xrightarrow{f} x = \frac{ry+1}{y-r} \rightarrow xy - rx = ry + 1 \rightarrow y(x-r) = ry+1$$

$$\rightarrow y = \frac{rx+1}{x-r}$$

$$Q(x) = \frac{|x-1|}{|x-r|} \xrightarrow{\text{Satz}} \frac{1}{\frac{1}{|x-1|} \cdot \frac{1}{|x-r|}} = \frac{1}{\frac{1}{|x-1|} \cdot \frac{1}{|x-r|}}$$



$$[a, b] \rightarrow rx - \varepsilon = y \sim ry - \varepsilon = x \rightarrow y = \frac{x + \varepsilon}{r}$$



$$x^r - \frac{x^r + 1 + rx^r + r^2}{x+r} = \frac{x^r + rx^r - x^r - 1 - rx^r - r^2}{x+r} = \frac{-1 - rx^r}{x+r} = y$$

$$\rightarrow \frac{r(-x^r - 1)}{r(x+r)} = \frac{1(ax+b)}{-(x+d)} \rightarrow \frac{-r - 4x}{r+4x} = \frac{rax+rb}{4x+rd} \rightarrow b = -r$$

$$Q(x)^{-1} = \frac{-4(x)-r}{r(-x)+4} \xrightarrow{x \rightarrow \frac{1}{r}} \frac{-1-1}{-1+4} = \frac{-2}{3} = r$$

$$Q(x) = \frac{x}{x^r+1} \rightarrow y(x^r+1) = x \rightarrow yx^r - x + y = 0 \rightarrow \Delta = 1 - 4y^r$$

$$x = \frac{1 \pm \sqrt{1-4y^r}}{2y} \sim 1 - 4y^r \geq 0 \rightarrow 4y^r \leq 1 \rightarrow y^r \leq \frac{1}{4} \rightarrow -\frac{1}{r} \leq y \leq \frac{1}{r}$$

$$Q(x)^{-1} = \frac{1 \pm \sqrt{1-4y^r}}{2y} \rightarrow Q(x)^{-1} = \frac{1 + \sqrt{1-4y^r}}{2y}, x \in \left[-\frac{1}{r}, \frac{1}{r}\right], x \neq 0$$