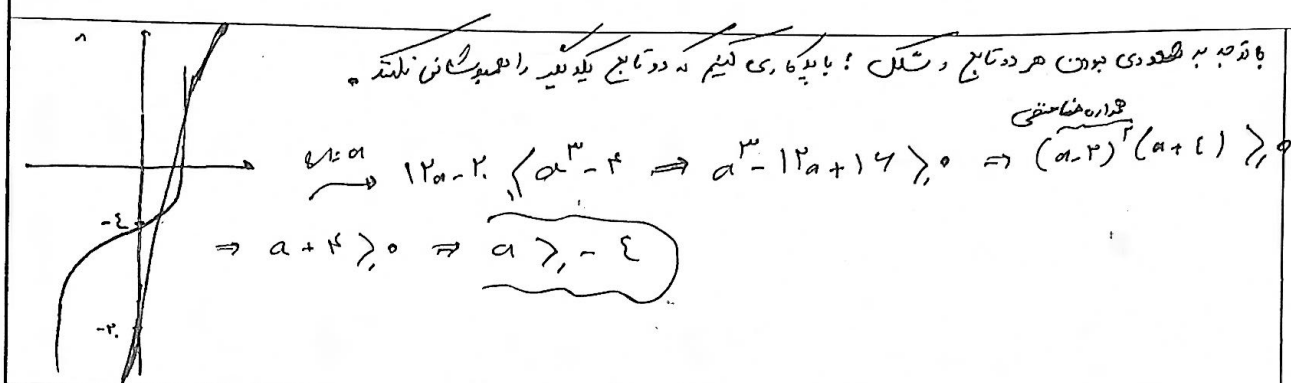




انت $\rightarrow f^{-1}(2) = 2 \Rightarrow f(2) = 2 \Rightarrow f(2) = 3 \times 2 + k = 12 + k = 2$

$\Rightarrow k = -10 \Rightarrow f(7) = (3 \times 7) - 10 = 21 - 10 = 11$

ب. $f(f(a)) = f(3a - 10) = 3(3a - 10) - 10 = 9a - 40$

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

$f^{-1}(2a) = a \Rightarrow f^{-1}(2a) = \frac{2a}{2a-1} = \frac{2a}{a} = 2 \Rightarrow a = 2$

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

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

ج. $f \circ g^{-1} = \{(2, 5), (5, 9)\}$

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

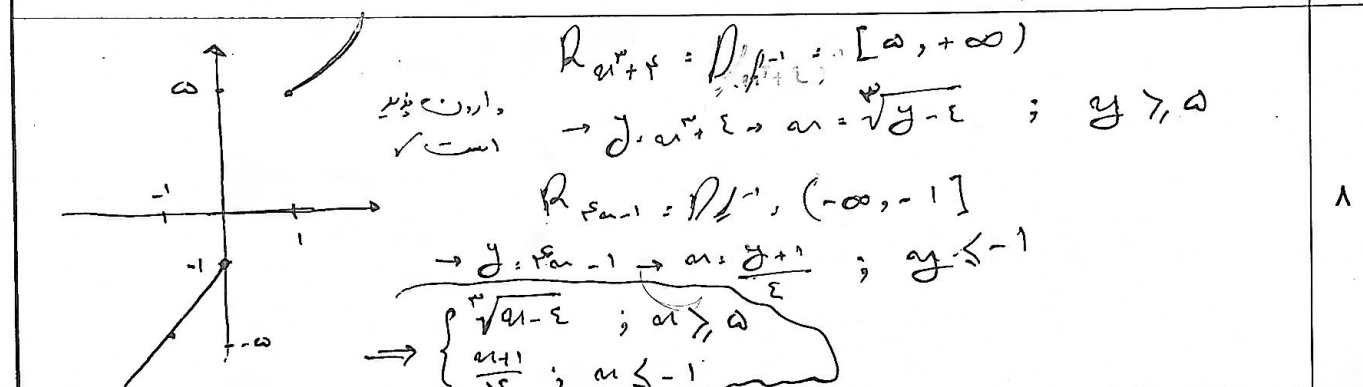
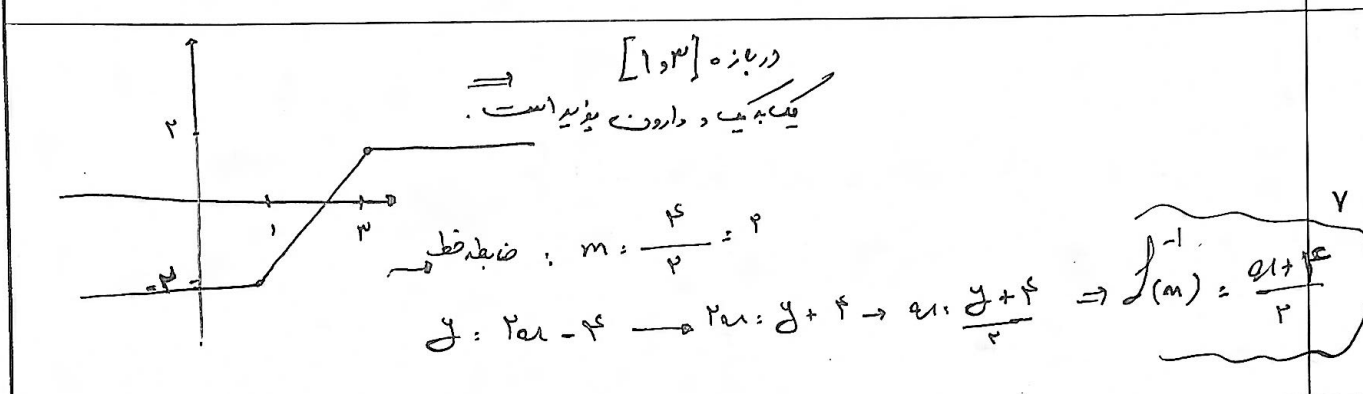
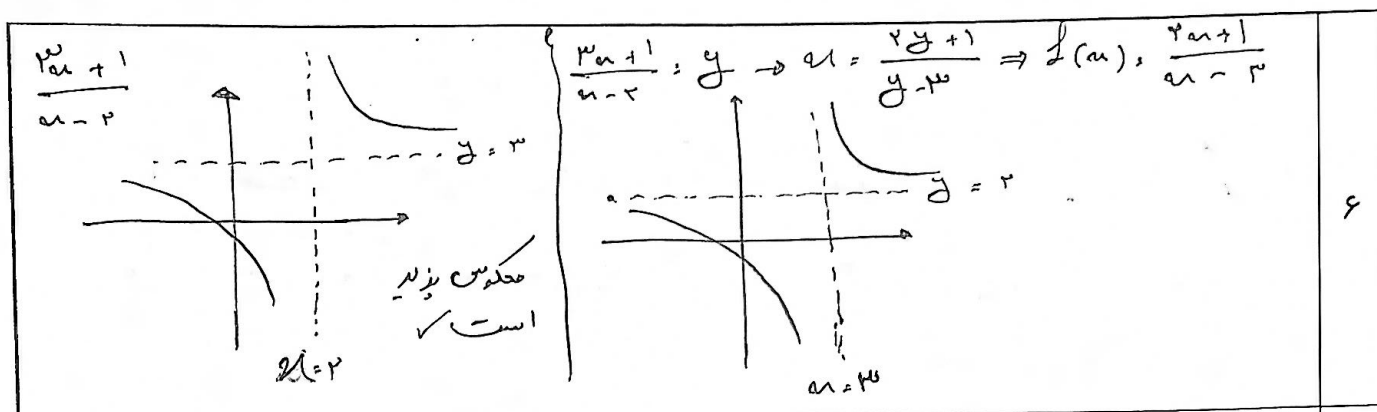
$D_h = \{1, 3, 4, 5\} \xrightarrow{h} D_{\frac{h}{\log^{-1}}} = \{1, 3\}$

$D_{\log^{-1}} = \{1, 3, 5\}$

به ازای $5 = 1$ که خارج می شود

و عبارت تعریف شده است.

$\Rightarrow \frac{h}{\log^{-1}} = \{(1, \frac{1}{4}), (3, \frac{1}{4})\}$



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

$\rightarrow \frac{-3a-1}{a+3} = y \Rightarrow a = \frac{3y+1}{y+3} = \frac{-3y-1}{y+3} \Rightarrow f(a) = \frac{-3a-1}{a+3} \xrightarrow{x^2} \frac{-9a-2}{2a+9}$

$\Rightarrow b = \frac{-2}{-1} \Rightarrow f(-2) = \frac{-4(-2)-2}{2(-2)+9} = \frac{14-2}{-4+9} = \frac{12}{5} = 2.4$

$f(a), \frac{a}{a^2+1} \rightarrow D_{f^{-1}} = R_f \Rightarrow y a^2 + y \pm a \Rightarrow y a^2 + y - a = 0 \Rightarrow y a^2 - a + y = 0$

$\Delta \geq 0 \Rightarrow 1 - 4y^2 \geq 0 \Rightarrow 1 \geq 4y^2 \Rightarrow y^2 \geq \frac{1}{4} \Rightarrow \frac{1}{2} \geq y \geq -\frac{1}{2} = D_{f^{-1}}$

$y = \frac{a}{a^2+1} \rightarrow a = \frac{y}{y^2+1} \rightarrow a y^2 + a - y = 0 \Rightarrow y = \frac{1 \pm \sqrt{1-4a^2}}{2a} ; a \in [-\frac{1}{2}, \frac{1}{2}]$