

$$y = -\frac{1}{3}x^3 + \frac{1}{3}x + 1 \Rightarrow y = -\frac{1}{3}(x-1)^3 + 2 \xrightarrow{y=0} -\frac{1}{3}(x-1)^3 + 2 = 0 \Rightarrow (x-1)^3 = 6 \Rightarrow (x-1)^2 = 6$$

$$\Rightarrow x-1 = \pm \sqrt{6} \Rightarrow \begin{cases} x=1+\sqrt{6} \\ x=1-\sqrt{6} \end{cases}$$

$$g(x) = y \circ (1 - \sqrt{6}/(3x+1))$$

$$f \rightarrow x_s = 1 \xrightarrow{f(3x+1)} g \rightarrow x_s = -\frac{1}{3} = \alpha$$

$$f \rightarrow y_s = 1 \xrightarrow{1-\sqrt{6}} g \rightarrow y_s = -\sqrt{6} = \beta \rightarrow \alpha/\beta = (-\frac{1}{3})/(-\sqrt{6}) = \frac{1}{3\sqrt{6}}$$

$$y = 3 - \sqrt{2x} \xrightarrow{\text{بجای } x \text{ از } x+1} y = 3 - \sqrt{2(x+1)} \xrightarrow{\text{بجای } y \text{ از } y+2} y = \sqrt{2x+2} - 3 \xrightarrow{\text{بجای } y \text{ از } y+2} y = \sqrt{2x+2} + 2$$

$$\sqrt{2x+2} + 2 = \frac{1}{2} \Rightarrow \sqrt{2x+2} = -\frac{3}{2} \Rightarrow 2x+2 = \frac{9}{4} \Rightarrow 2x = \frac{1}{4} \Rightarrow x = \frac{1}{8}$$

$$h(x) = f(x+1) + g(x+1) \quad D_h = D_f \cap D_g(x+1) = (-2, 5) \Rightarrow (a+1, \omega) \cup [-1, b-1] = (-2, 5)$$

$$D_f = (a, 5]$$

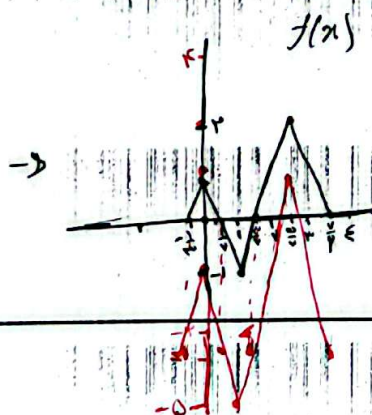
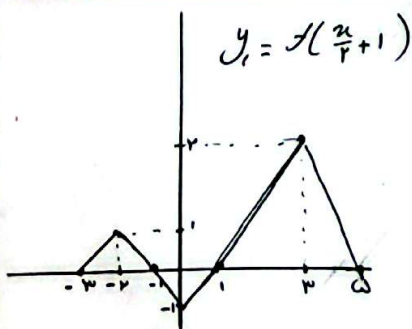
$$D_{f(x+1)} = (a+1, \omega]$$

$$D_g = [-1, b)$$

$$D_{g(x+1)} = [-2, b-1)$$

$$\Rightarrow a+1 = -2 \Rightarrow a = -3 \quad \text{و} \quad b-1 = 5 \Rightarrow b = 6$$

$$a \cdot b = -3 \cdot 6 = -18$$



$$D_y \rightarrow |2f(x) - 3| \geq 0$$

$$D_y = D_f \Leftrightarrow \text{همیشه} \Rightarrow [-\frac{1}{2}, \frac{1}{2}]$$

$$R_y = [-\omega, 1]$$

$$\rightarrow R_{f(x)-3} = [0, \omega]$$

$$\rightarrow R_{\sqrt{f(x)-3}} = [0, \sqrt{\omega}]$$



$$y = \frac{x}{a} [ax]$$

$$\frac{m}{a} [am] = \frac{1}{2} \quad (1)$$

$$\Rightarrow am = 1 \quad (2)$$

$$m = \frac{1}{a}$$

$$a = -\frac{1}{m}$$

$$b = 1$$

$$(m, 0) \Rightarrow [ax] = 0$$

$$0 \leq \frac{(m, 1)}{a} < 1 \Rightarrow \text{range } [1, am)$$

$$(1), (2) \Rightarrow \frac{m}{a} = \frac{1}{2} \Rightarrow \frac{a}{m} = 2 \Rightarrow m = \pm \frac{1}{2}$$

$$\text{and } \frac{1}{m} < m$$

$$b = a = \sqrt{2}$$

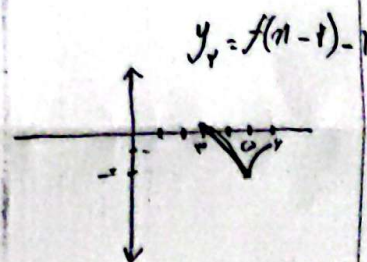
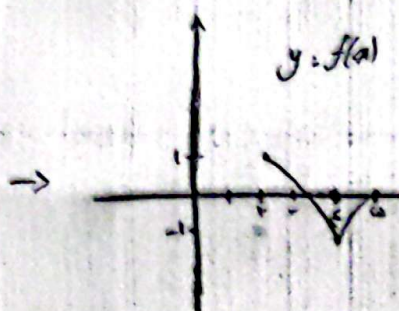
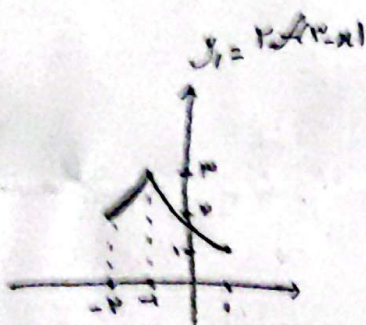
$$y = \log_p x \xrightarrow{x \rightarrow p} y = \log_p x + p \xrightarrow{x \rightarrow p} y = -\log_p x + p \xrightarrow{x \rightarrow p} y = -\log_p x + p = g(x)$$

$$g(x) = -\log_p \frac{1}{x} + p = -1$$

$$-\log_p \frac{1}{x}$$

$$\Rightarrow g(1-\varepsilon) + g(1-\varepsilon) = -1 + (-1) = -2$$

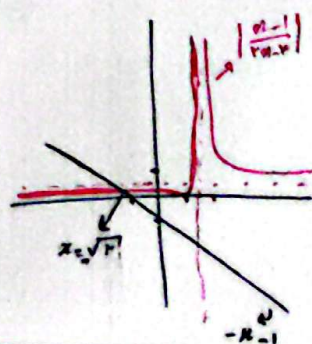
$$g(1-\varepsilon) = -\log_p \frac{1}{1-\varepsilon} + p = -\log_p \frac{1}{1-\varepsilon} + p = -1$$



$$f(x) = g = \left| \frac{x-1}{x+1} \right| \xrightarrow{x \rightarrow -1} y = \left| \frac{(x-1)+1}{x(x-1)+1} \right| \xrightarrow{x \rightarrow -1} g(x) = \left| \frac{x-1}{x(x-1)+1} \right| + 1$$

$$x+1 + \left| \frac{x-1}{x(x-1)+1} \right| < 0 \Rightarrow \left| \frac{x-1}{x(x-1)+1} \right| < -x-1$$

$$(-\infty, -\sqrt{2})$$



$\sqrt{x(x-1)} \geq f(x)$ $m f(x) - f(x) \geq 0 \Rightarrow \sqrt{x(x-1)} \geq f(x) \Rightarrow \sqrt{x(x-1)} \geq \frac{x-1}{x(x-1)+1} + 1$ $\sqrt{x(x-1)} \geq f(x)$

$$\sqrt{x(x-1)} \geq f(x) \Rightarrow x = 0, 1, 2 \Rightarrow \text{valid}$$

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

$$\sqrt{x(x-1)} \geq f(x) \Rightarrow \sqrt{x(x-1)} \geq \frac{p}{x} (x-1) + p \Rightarrow \sqrt{x(x-1)} \geq \frac{1}{x} (x-1) + 1$$

$$(x-1) \geq \frac{1}{x} \Rightarrow \frac{1}{x} \leq 1$$