

الف) $y^3 - 2x^2 = 2x - 1$ تقریب $\begin{cases} y_1^3 - 2x_1^2 = 2x_1 - 1 \\ y_2^3 - 2x_2^2 = 2x_2 - 1 \end{cases} \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2$ تابع است	ب) $x \cos y = y \cos x$ تابع نپ $x = \frac{\pi}{2}$ مثال فرض $\frac{\pi}{2} \cos y = 0 \Rightarrow y = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$
۲) $\frac{x+y}{2} = \sqrt{xy} \Rightarrow x+y = 2\sqrt{xy} \Rightarrow x+y-2\sqrt{xy} = 0$ $\Rightarrow (\sqrt{x} - \sqrt{y})^2 = 0 \Rightarrow \sqrt{x} = \sqrt{y} \Rightarrow x = y$ تابع است و همانی	تابع است $x^2y^2 + 2x - y^3 - 2y = 0$ $x(y^2+2) - y(y^2+2) = 0$ $(y^2+2)(x-y) = 0 \Rightarrow y^2+2=0$ غیرممکن $\Rightarrow x-y=0 \Rightarrow x=y$
$f(x) = \begin{cases} 2x^2 - b & ; x-1 \geq 2 \\ a + 2x & ; -3 \leq x \leq -1 \end{cases} = \begin{cases} 2x^2 - b & ; x \geq 3 \\ 2x^2 - b & ; x \leq -1 \\ a + 2x & ; -3 \leq x \leq -1 \end{cases}$ $2(-1)^2 - b = a + 2(-1)$ $2 - b = a - 2$ $a + b = 4$	
$f(x) = \sqrt{a - bx - x^2}$ } $D_f = [b, a]$ $f(x) = \sqrt{-(x-a)(x-b)}$ } $\Rightarrow -x^2 - bx + a = -x^2 + (a+b)x - ab$ $a+b = -b \Rightarrow a = -2b$ $a = -ab \xrightarrow{a \neq 0} b = -1$ } $\Rightarrow a = 2$ $a+b = -2-1 = -3$	
$y = \frac{2}{\sqrt{ax^2 + bx + c}}$ } $D_f = (-\infty, 2)$ با توجه به شکل راجعه تابع درجه دوم است بنا بر این $a < 0$ $bx + c > 0 \Rightarrow x > -\frac{c}{b} = 2 \Rightarrow -c = 2b \Rightarrow c = -2b$ $\frac{2a+c-3 b }{0 \quad -2b} = -2b+3b = b$	
الف) $f(x) = \sqrt{\frac{1}{ x - [x]}}$ } $x \neq [x]$ $x \geq 0$ } $x \in [x]$ } $x \in \mathbb{Z}$ } $D_f = \mathbb{R} - \mathbb{Z} - \{0\}$ $x < 0$ } $-x \in [x]$ } $-x \in \mathbb{Z}$ } $x \in \mathbb{Z}$	
ب) $f(x) = \sqrt{x} + \sqrt{y} = 9$ } $\sqrt{y} = 9 - \sqrt{x}$ $\sqrt{x} \Rightarrow x \geq 0$ } $9 - \sqrt{x} \geq 0 \Rightarrow 9 \geq \sqrt{x} \Rightarrow 81 \geq x$ $D_f = [0, 81]$	

$$f(x) = \sqrt{\log_{x-1} x} \quad x-1 > 0 \rightarrow x > 1$$

$$x > 0 \quad x \neq 1$$

$$\log_{x-1} x \geq \frac{x}{x-1} \Rightarrow x-1 \geq 1 \rightarrow x \geq 2 \Rightarrow x \geq \frac{1}{p} \quad \text{I} \cap \text{II} = [1, +\infty)$$

$$\log_{x-1} x \geq \frac{x}{x-1} \Rightarrow x-1 \leq 1 \rightarrow x \leq 2 \rightarrow x \leq \frac{1}{p} \Rightarrow x \in (0, \frac{1}{p}]$$

$$D_f = \left(\frac{1}{p}, \frac{1}{p} \right] \cup [1, +\infty)$$

$$b) f(x) = \log \frac{1}{x + \sqrt{x^2 - 1}}$$

$$\frac{1}{x + \sqrt{x^2 - 1}} > 0 \rightarrow x + \sqrt{x^2 - 1} < 0$$

$$-(\sqrt{x^2 - 1} - x)(\sqrt{x^2 - 1} + x) < 0$$

$$x \in (-9, 9)$$

$$x_1, x_2 = \pm 9 \quad -9 + 9 = 0$$

$$y = \sqrt{\frac{x^2 + 1}{x + b}} + a$$

$$D_f = (1, +\infty)$$

با توجه به فرمت (a) ضرب در صورت و مخرج

$$\frac{x^2 + 1}{x + b} + a \geq 0 \Rightarrow \frac{x^2 + 1 + ax + ba}{x + b} \geq 0 \Rightarrow \frac{x(x + a) + 1 + ba}{x + b} \geq 0$$

$$\begin{cases} a = -1 \\ b = -1 \end{cases}$$

$$\frac{1}{x - 1} \geq 0$$

$$f(x) = \begin{cases} x-1; [x] > \varepsilon \\ \varepsilon x + 1; [x] \leq \varepsilon \end{cases} = \begin{cases} x-1; x > a \\ \varepsilon x + 1; x < a \end{cases}$$

$$\text{I} \quad x > a \Rightarrow y = \sqrt{x-1-x+1} = \sqrt{x} \Rightarrow x \geq 0 \quad \text{II} \Rightarrow \text{I} \cap \text{II} = [a, +\infty)$$

$$\text{III} \quad x < a \Rightarrow y = \sqrt{\varepsilon x + 1 - x + 1} = \sqrt{\varepsilon x + 2} \Rightarrow x \geq -\frac{2}{\varepsilon} \quad \text{IV} \Rightarrow \text{III} \cap \text{IV} = [-\frac{2}{\varepsilon}, a)$$

$$D_g = [-\frac{2}{\varepsilon}, +\infty)$$

$$y = \frac{x^2 + 1 + 4x + 1}{(\varepsilon x^2 + \varepsilon x + 1)^2} = \frac{1(1x^2 + 4x + 1)}{(x+1)^2} = \frac{1(x+1)^2}{(x+1)^2}$$

$$(x+1)^2 \neq 0 \Rightarrow x \neq -\frac{1}{2}$$

$$= \frac{1}{\varepsilon(x+1)^2}$$

$$D_f = \mathbb{R} - \left\{ -\frac{1}{2} \right\}$$

$$y = \sqrt{1 - \log(x-a)}$$

$$x-a > 0 \rightarrow x > \frac{a}{p}$$

$$1 - \log(x-a) \geq 0$$

$$D_f = (b, c] = \left[\frac{a}{p}, \frac{1+a}{p} \right] \rightarrow -\log(x-a) \geq -1 \rightarrow \log(x-a) \leq 1$$

$$\rightarrow x-a \leq 10$$

$$x \leq \frac{1+a}{p}$$

$$c - b = \frac{1+a}{p} - \frac{a}{p} = \frac{1}{p}$$