

$$x^2 - \varepsilon x + y^2 + 4y + K = 0$$

$$\Rightarrow \underbrace{x^2 - \varepsilon x}_{(x-1)^2 - 1} - 9 + K + (y+2)^2 = 0$$

$$\Rightarrow (x-1)^2 - 1 + (y+2)^2 - 9 + K = 0$$

$$\Rightarrow (x-1)^2 + (y+2)^2 + K - 11 = 0 \Rightarrow K \leq 11$$

$$f(x) \xrightarrow{x=a} a^2 + \varepsilon a = 2a + 2 \Rightarrow a^2 + a - 2 = 0$$

$$(a+2)(a-1) = 0 \Rightarrow \boxed{a=1} \checkmark \rightarrow a > 0$$

$$f(1) = (1)^2 + \varepsilon(1) = 2$$

$$|x+1| \geq \varepsilon \rightarrow x+1 \geq \varepsilon \Rightarrow x \geq \varepsilon - 1$$

$$|x+1| \geq \varepsilon \rightarrow x+1 \leq -\varepsilon \Rightarrow x \leq -\varepsilon - 1$$

$$f(x) = x^2 - b = a + \varepsilon x \rightarrow \text{فقط در نقطه } x = -3$$

$$\Rightarrow f(-3) = 11 - b = a - 4 \Rightarrow \boxed{a+b \leq 15} \checkmark$$

$$\sqrt{4x-a} \Rightarrow 4x-a \geq 0 \Rightarrow a \leq 4x \Rightarrow \frac{a}{4} \leq x$$

$$\sqrt{b-4x} \Rightarrow b-4x \geq 0 \Rightarrow b \geq 4x \Rightarrow \frac{b}{4} \geq x$$

$$\left. \begin{aligned} \frac{a}{4} \leq x \Rightarrow a = 12 \\ \frac{b}{4} \geq x \Rightarrow b = 4 \end{aligned} \right\} \Rightarrow \boxed{\frac{b}{a} \leq \frac{4}{12} = \frac{1}{3}} \checkmark$$

$$y = \sqrt{\frac{x+1}{|x-1|}} + \sqrt{\frac{4-x}{x^2+x+2}} \rightarrow x \leq 4$$

$$\Delta = b^2 - 4ac < 0 \rightarrow \text{ریشه ندارد}$$

$$y = \sqrt{[x]-\varepsilon} + \sqrt{\varepsilon-[x]} \rightarrow [x]-\varepsilon \geq 0 \rightarrow [x] \geq \varepsilon \rightarrow x \geq \varepsilon$$

$$\rightarrow \varepsilon-[x] \geq 0 \rightarrow \varepsilon \geq [x] \rightarrow x < \varepsilon \rightarrow D_f = \emptyset$$

$$y = \sqrt{\frac{x^2 - x - 4}{x^2 - 15x^2 + 44}} \rightarrow \frac{x^2 - x - 4}{x^2 - 15x^2 + 44} \geq 0 \rightarrow \frac{-1}{15} - \frac{1}{x} - \frac{4}{x^2} \geq 0$$

(1, Va)

$$y = \sqrt{\frac{x^2 - 2x^2 - 0x + 4}{x^2 + 2x^2 - 4x - 4}} \rightarrow \frac{(x-1)(x+4)(x-2)}{(x+1)(x-2)(x+2)} \geq 0 \rightarrow \frac{-1}{1} - \frac{1}{x} - \frac{1}{x+1} - \frac{1}{x+2} \geq 0$$

$$D_f: (-\infty, -2) \cup (-1, 1) \cup (2, +\infty) - \{0\}$$

(الف) $\Rightarrow [-x] < 0 \Rightarrow [-x] > 0 \Rightarrow -x > 0$
 $x < -1 \Rightarrow D_f = (-\infty, -1]$

ج) $y = \frac{0x^2 + 4}{[x] - 1[x] - 1} \Rightarrow [x] - 1[x] - 1 \neq 0$
 $([x] - 1)([x] + 1) \neq 0 \Rightarrow D_f: \mathbb{R} - ([-1, 0) \cup [1, 2])$

د) $\Rightarrow \sin x \neq 0 \Rightarrow x \neq \{k\pi\}$
 $\sin y \neq 0 \Rightarrow x \neq \{k\pi + \frac{\pi}{2}\}$
 $D_f: \mathbb{R} - \{\frac{k\pi}{2}, k\pi - \frac{\pi}{2}\}$

ه) $\Rightarrow \sqrt{1 - \sin^2 x} \rightarrow 2 \sin^2 x \leq 1 \rightarrow \sin^2 x \leq \frac{1}{2}$
 $D_f: \{k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4}\}$

و) $\Rightarrow \begin{cases} x-1 > 0 \rightarrow x > 1 \\ 1 - \log_{\frac{1}{2}} x > 0 \rightarrow \log_{\frac{1}{2}} x < 1 \rightarrow x-1 > \frac{1}{2} \\ x > \frac{1}{2} \end{cases}$
 $D_f: [\frac{3}{2}, +\infty)$

ز) $\Rightarrow \begin{cases} x^2 - x > 0 \\ x^2 - 2x > 0 \\ x^2 - 2x \neq 1 \end{cases} \rightarrow \frac{0}{x} - \frac{1}{x} > 0 \rightarrow \frac{1}{x} < 1$
 $D_f = (-\infty, -1) \cup (-1, 0) \cup (0, 2) \cup (2, +\infty)$

ح) $y = \sqrt{\frac{x^2 - x^2}{x^2 - 1}} \Rightarrow \frac{x^2 - x^2}{x^2 - 1} \geq 0 \Rightarrow \frac{0}{x^2 - 1} \geq 0$
 $\rightarrow x^2 - 1 \leq 0 \Rightarrow (x-1)(x+1) \leq 0 \rightarrow D_f: [-1, 1]$

ط) $y = \left(\frac{x+1}{x+2}\right)! \Rightarrow \frac{x+1}{x+2} = w \Rightarrow w + \frac{1}{w} = 2$
 $x = \frac{w-1}{w-2} \Rightarrow D_f: \{x | x = \frac{w-1}{w-2}, w \in \mathbb{N}\}$