

$$x^2 + y^2 - 4x + 4y + k = 0 \xrightarrow{\text{تکمیل مربع}} 2(x-1)^2 + (y+2)^2 = 0$$

$$\Rightarrow x^2 + 2 - 4x + y^2 + 4y + 4 = k \Rightarrow x^2 + y^2 - 4x + 4y + 6 = k$$

لج-م-نقده (۱-۳) ✓

$$f(x) = \begin{cases} x^2 + kx & ; x \geq a \\ kx + a^2 & ; x < a \end{cases} \xrightarrow{x=a} a^2 + ka = ka + a^2 \Rightarrow a^2 + a + 2 = 0$$

$$\rightarrow (a+2)(a-1) = 0 \begin{cases} a=1 \\ a=-2 \end{cases} \xrightarrow{a=1} |a=1| \Rightarrow f(x) = \begin{cases} x^2 + x & ; x \geq 1 \\ x + 2 & ; x < 1 \end{cases}$$

(۵) ✓

$$f(1) = 1 + f(1) = 1 + 2 = 3$$

$$f(x) = \begin{cases} x^2 - b & ; |x+1| \geq 2 \\ a + kx & ; -3 \leq |x+1| < 2 \end{cases} \xrightarrow{x=-3} \frac{2(-3)^2 - b}{1} = a + 2(-3) \Rightarrow a + b = 24$$

(۵) ✓

$$y = \sqrt{4x-a} + \sqrt{b-4x}$$

$$\begin{aligned} 4x-a &\xrightarrow{x=1} 4-a=0 \rightarrow |a=4| \\ b-4x &\xrightarrow{x=1} b-4=0 \rightarrow |b=4| \end{aligned}$$

$$\left\{ \frac{b}{a} = \frac{4}{4} = 1 \right\}$$

(۵) ✓

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

$$\begin{aligned} \frac{x+1}{|x-1|} &\geq 0 \rightarrow \frac{-1}{-1+1} + \frac{1}{1+1} = \frac{1}{2} \\ \frac{4-x}{x^2+kx+4} &\geq 0 \rightarrow \frac{-1}{4-k} + \frac{1}{4+k} = \frac{1}{4-k^2} \end{aligned}$$

(۵) ✓

$$y = \sqrt{[x]-4} + \sqrt{4-[x]}$$

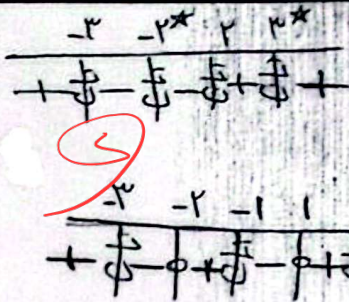
$$\begin{aligned} [x]-4 \geq 0 &\rightarrow [x] \geq 4 \rightarrow x \geq 4 \\ 4-[x] \geq 0 &\rightarrow [x] \leq 4 \rightarrow x \leq 4 \end{aligned}$$

(۵) ✓

$$\Rightarrow \emptyset \Rightarrow D_f = \emptyset$$

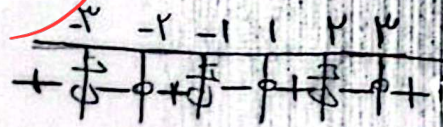
$$a) y = \sqrt{\frac{n^2 - n - 4}{n^2 - 15n^2 + 4}} \Rightarrow \frac{(n-2)(n+1)}{(n-2)(n+1)(n-4)(n+4)} \geq 0$$

$$\Rightarrow D_f = (-\infty, -2) \cup (1, +\infty) - \{4\}$$



$$b) y = \sqrt{\frac{n^2 - 2n^2 - 2n + 4}{n^2 + 2n^2 - 2n - 4}} \Rightarrow \frac{(n-1)(n-2)(n+1)}{(n+1)(n-2)(n-4)} \geq 0$$

$$D_f = (-\infty, -2) \cup [2, -1) \cup [1, 2) \cup [4, +\infty)$$



$$a) y = \sqrt{[-n] - 2} \rightarrow [-n] - 2 \geq 0 \rightarrow [-n] \geq 2 \rightarrow -n \geq 2 \rightarrow n \leq -2$$

$$D_f = (-\infty, -2]$$

$$b) y = \frac{2n^2 + 4}{[n]^2 - 2[n] - 2} \rightarrow [n]^2 - 2[n] - 2 \neq 0 \rightarrow ([n] - 2)([n] + 1) \neq 0$$

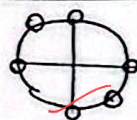
$$\Rightarrow [n] - 2 \neq 0 \rightarrow [n] \neq 2 \rightarrow n \neq [2, 4)$$

$$[n] + 1 \neq 0 \rightarrow [n] \neq -1 \rightarrow n \neq [-1, 0)$$

$$D_f = \mathbb{R} - ([2, 4) \cup [-1, 0))$$

$$a) y = \frac{\cot n + 1}{\tan n + 1} \Rightarrow \begin{matrix} \sin n \neq 0 \\ \cos n \neq 0 \\ \tan n + 1 \neq 0 \rightarrow \tan n \neq -1 \end{matrix}$$

$$D_f = \mathbb{R} - \left\{ \frac{k\pi}{2}, k\pi - \frac{\pi}{4} \right\}$$



$$b) y = \sqrt{1 - \sin^2 n} \Rightarrow 1 - \sin^2 n \geq 0 \rightarrow \sin^2 n \leq 1 \rightarrow -1 \leq \sin n \leq 1$$



$$D_f = \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$$

$$a) y = \sqrt{1 - \log \frac{n-1}{f}} \Rightarrow \begin{matrix} n-1 > 0 \rightarrow n > 1 \\ 1 - \log \frac{n-1}{f} \geq 0 \Rightarrow \log \frac{n-1}{f} \leq 1 \rightarrow n-1 \leq f \rightarrow n \leq \frac{f}{f-1} \end{matrix}$$

$$D_f = \left[\frac{f}{f-1}, +\infty \right)$$

$$b) y = \frac{\sqrt{n^2 - n}}{1 - \log \frac{n^2 - n}{f}} \Rightarrow \begin{matrix} n^2 - n \geq 0 \rightarrow n(n-1) \geq 0 \\ 1 - \log \frac{n^2 - n}{f} \neq 0 \rightarrow \log \frac{n^2 - n}{f} \neq 1 \rightarrow n^2 - n \neq f \end{matrix}$$

$$\Rightarrow \begin{matrix} n^2 - n \geq 0 \rightarrow (n-1)(n+1) \geq 0 \rightarrow n \in \{f, -1\} \\ n^2 - n > 0 \rightarrow n(n-1) > 0 \end{matrix}$$

$$D_f = (-\infty, 0) \cup (f, +\infty) - \{f, -1\}$$

$$a) y = \sqrt{f^{n-n^2} - 1} \rightarrow f^{n-n^2} - 1 \geq 0 \rightarrow f^{n-n^2} \geq 1 \rightarrow (n-1)(n-1/2) \geq 0$$

$$D_f = [1, 3]$$

$$\Rightarrow \left(\frac{f^{n+1}}{f^{n+1}} \right)! \rightarrow \frac{f^{n+1}}{f^{n+1}} \in \mathbb{W} \rightarrow n \in \frac{-f\mathbb{W} + 1}{f\mathbb{W} - f}$$

$$\Rightarrow D_f = \left\{ n \mid n = \frac{\Delta - f k}{f k - f}, k \in \mathbb{W} \right\}$$