

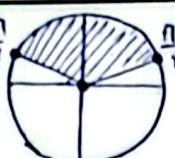
الف) $y = \sqrt{\frac{n^2-4n}{n^2-n}} \rightarrow \frac{n^2-4n}{n^2-n} \geq 0 \rightarrow \frac{n(n-4)}{n(n-1)} \geq 0 \rightarrow \frac{n-4}{n-1} \geq 0$
 جدول تغییر علامت: $\frac{n-4}{n-1}$
 $n < 1$ $\frac{n-4}{n-1} < 0$ $n > 1$ $\frac{n-4}{n-1} > 0$
 $n < 1$ $\frac{n-4}{n-1} < 0$ $n > 1$ $\frac{n-4}{n-1} > 0$
 $Df = (-1, 0) \cup (0, 1) \cup [4, +\infty)$
 ب) $y = \sqrt{\frac{n^4-n^3}{n^3-n}} \rightarrow \frac{n^4-n^3}{n^3-n} \geq 0 \rightarrow \frac{n^3(n-1)}{n^2(n-1)} \geq 0 \rightarrow \frac{n^3}{n^2} \geq 0 \rightarrow n \geq 0$
 $Df = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$
 $Df = \mathbb{R} - \{-1, 0, 1\}$

الف) $y = \frac{n+1}{\sqrt{n+1n}} \rightarrow n+1 > 0 \rightarrow n > -1$
 $Df = \mathbb{R}^+$ $Df = (0, +\infty)$
 ب) $y = \frac{1}{\sqrt{n+1n}} \rightarrow n+1 > 0 \rightarrow n > -1$
 $Df = \mathbb{R}^+$ $Df = (0, +\infty)$

الف) $y = \sqrt{2-[n]} \rightarrow 2-[n] \geq 0 \rightarrow [n] \leq 2 \Rightarrow Df = (-\infty, 3)$
 ب) $y = \frac{1}{\sqrt{2-[n]}} \rightarrow 2-[n] > 0 \rightarrow [n] < 2 \Rightarrow Df = (-\infty, 2)$

الف) $y = \sqrt{[n-\frac{1}{p}] + [n+\frac{1}{p}]} \rightarrow [n-\frac{1}{p}] + [n+\frac{1}{p}] \geq 0 \Rightarrow [n-\frac{1}{p}] + [n-\frac{1}{p}+1] \geq 0$
 $= [n-\frac{1}{p}] + [n-\frac{1}{p}] + 1 \geq 0 \Rightarrow 2[n-\frac{1}{p}] \geq -1 \Rightarrow [n-\frac{1}{p}] \geq -\frac{1}{2}$
 $= n \geq \frac{1}{p} \Rightarrow Df = [\frac{1}{p}, +\infty)$
 ب) $y = \sqrt{[n-\frac{1}{p}] + [n+\frac{1}{p}]} \rightarrow [n-\frac{1}{p}] + [n+\frac{1}{p}] \geq 0 \Rightarrow [n-\frac{1}{p}] + [-(n-\frac{1}{p})] \geq 0$
 $\text{if } \begin{cases} a \in \mathbb{Z} & [a] + [a] = 0 \checkmark \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \times \end{cases} \Rightarrow n - \frac{1}{p} \in \mathbb{Z} \rightarrow n \in \mathbb{Z} + \frac{1}{p} \Rightarrow Df = \{n | n = k + \frac{1}{p}, k \in \mathbb{Z}\}$

الف) $y = \frac{2}{\sin n - 1} \rightarrow \sin n - 1 \neq 0 \rightarrow \sin n \neq 1$
 $\Rightarrow Df = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$
 ب) $y = \frac{3}{2\sin^2 n - 1} \rightarrow 2\sin^2 n - 1 \neq 0 \rightarrow 2\sin^2 n \neq 1 \rightarrow \sin^2 n \neq \frac{1}{2} \rightarrow \sin n \neq \pm \frac{1}{\sqrt{2}}$
 $\Rightarrow Df = \mathbb{R} - \{ \frac{k\pi}{2} \pm \frac{\pi}{4} \}$

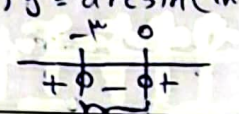
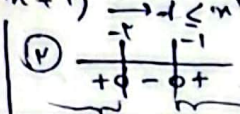
الف) $y = \sqrt{x \sin x - 1} \rightarrow x \sin x - 1 \geq 0 \rightarrow x \sin x \geq 1 \rightarrow \sin x \geq \frac{1}{x}$ 

$Df = [2k\pi + \frac{\pi}{4}, 2k\pi + \frac{5\pi}{4}]$

ب) $y = \sqrt{\cos x - 1} \rightarrow \cos x - 1 \geq 0 \rightarrow \cos x \geq 1$ 

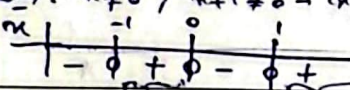
$\Rightarrow Df = \{2k\pi\} \cup Df = \{2k\pi | k \in \mathbb{Z}\}$
 توجه داریم که مقادیر x در این مجموعه به گونه‌ای هستند که $\cos x = 1$ باشد.

الف) $\cos y = |x| - 3 \rightarrow -1 \leq |x| - 3 \leq 1 \rightarrow 2 \leq |x| \leq 4 \rightarrow 2 \leq x \leq 4$
 $\Rightarrow Df = [-4, -2] \cup [2, 4]$

توجه داریم که مقادیر $|x| - 3$ متناظر با زاویه y در بازه $[-1, 1]$ قرار داشته باشند.
 توجه داریم که عبارت $\arcsin$ و $\arccos$ برای زاویه y در بازه $[-1, 1]$ است.
 ب) $y = \arcsin(x^2 + 2x + 1) \rightarrow -1 \leq x^2 + 2x + 1 \leq 1$
 $x^2 + 2x + 1 \leq 1 \rightarrow x^2 + 2x \leq 0 \rightarrow x(x+2) \leq 0 \rightarrow -2 \leq x \leq 0$
 $x^2 + 2x + 1 \geq -1 \rightarrow x^2 + 2x + 2 \geq 0 \rightarrow (x+1)^2 + 1 \geq 0$
 این همیشه درست است.
 ① 
 ② 

$\Rightarrow Df = [-2, 0] \cup [-1, 0] = [-2, 0]$

الف) $y = \sqrt{x \log_3(x-2)} \rightarrow \begin{cases} x-2 > 0 \rightarrow x > 2 \\ x \log_3(x-2) \geq 0 \end{cases}$
 $\rightarrow 2 < x \leq 11 \rightarrow Df = (2, 11]$
 $\log_3(x-2) \leq 2 \rightarrow x-2 \leq 9 \rightarrow x \leq 11$

ب) $y = \log(x^3 - x) \rightarrow x^3 - x > 0 \rightarrow x(x^2 - 1) > 0 \rightarrow x(x+1)(x-1) > 0$
 توجه: $x \neq 0, x+1 \neq 0 \rightarrow x \neq -1, x-1 \neq 0 \rightarrow x \neq 1$

 $\Rightarrow Df = (-1, 0) \cup (1, +\infty)$

الف) $y = \frac{x}{x^2 + 1} \rightarrow x^2 + 1 \neq 0 \rightarrow x^2 \neq -1$
 $Df = \mathbb{R}$
 توجه: این تابع برای تمام x تعریف شده است.

ب) $y = \frac{x}{x^2 - 1} \rightarrow x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow x \neq \pm 1 \rightarrow Df = \mathbb{R} - \{0\}$

ج) $y = \frac{x}{x^2 - 2} \rightarrow x^2 - 2 \neq 0 \rightarrow x^2 \neq 2 \rightarrow x \neq \pm \sqrt{2} \rightarrow Df = \mathbb{R} - \{\pm \sqrt{2}\}$

د) $y = \frac{x}{x^2 - 3} \rightarrow x^2 - 3 \neq 0 \rightarrow x^2 \neq 3 \rightarrow x \neq \pm \sqrt{3} \rightarrow Df = \mathbb{R} - \{\pm \sqrt{3}\}$

الف) $y = (x+1)! \rightarrow x+1 \in \mathbb{N} \rightarrow x \in \mathbb{N} - 1 \rightarrow x \in \frac{\mathbb{N}-1}{k}$
 $\Rightarrow Df = \{x | x = \frac{k-1}{k}, k \in \mathbb{N}\}$

ب) $y = \left(\frac{x^2 - 2}{x^2 - 5}\right)! \rightarrow \frac{x^2 - 2}{x^2 - 5} \in \mathbb{N}$
 $\frac{x^2 - 2}{x^2 - 5} = k \rightarrow x^2 - 2 = k(x^2 - 5) \rightarrow x^2 - 2 = kx^2 - 5k \rightarrow x^2(1-k) = -5k + 2$
 $x^2 = \frac{-5k + 2}{1-k} \rightarrow x = \pm \sqrt{\frac{-5k + 2}{1-k}}$
 $\Rightarrow Df = \{x | x = \pm \sqrt{\frac{-5k + 2}{1-k}}, k \in \mathbb{N}\}$