

۱. $y = \sqrt{\frac{x^2-9x}{x^3-x}} \Rightarrow \begin{cases} \frac{x^2-9x}{x^3-x} \geq 0 \Rightarrow \frac{x(x-9)}{x(x-1)(x+1)} \geq 0 \\ x^3-x \neq 0 \Rightarrow x(x-1)(x+1) \neq 0 \end{cases}$

$D_f = [1, +\infty) \cup (0, 1) \cup (-1, 0)$

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

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

۲. الف) $y = \frac{x+1}{\sqrt{x+|x|}} \Rightarrow \begin{cases} \sqrt{x+|x|} \neq 0 \\ x+|x| \geq 0 \end{cases} \Rightarrow x+|x| > 0 \Rightarrow D_f = \mathbb{R}^+$

ب) $y = \frac{1}{\sqrt{x/|x|}} \Rightarrow x/|x| > 0 \Rightarrow D_f = \mathbb{R}^+$

۳. الف) $y = \sqrt{2-[x]} \Rightarrow 2-[x] \geq 0 \Rightarrow [x] \leq 2 \Rightarrow D_f = (-\infty, 2)$

ب) $y = \frac{1}{\sqrt{2-[x]}} \Rightarrow 2-[x] > 0 \Rightarrow [x] < 2 \Rightarrow D_f = (-\infty, 2)$

۴. الف) $y = \sqrt{[x-\frac{1}{p}]+[x+\frac{1}{p}]} \Rightarrow [x-\frac{1}{p}]+[x+\frac{1}{p}] \geq 0 \Rightarrow 2[x+\frac{1}{p}] \geq 1$

$\Rightarrow [x+\frac{1}{p}] \geq \frac{1}{2} \Rightarrow [x+\frac{1}{p}] \geq 1 \Rightarrow x+\frac{1}{p} \geq 1 \Rightarrow x \geq \frac{1}{p}$

ب) $y = \sqrt{[x-\frac{1}{p}]+[-x+\frac{1}{p}]} \Rightarrow [x-\frac{1}{p}]+[-x+\frac{1}{p}] = 0$

$\Rightarrow x-\frac{1}{p} \in \mathbb{Z} \Rightarrow D_f = \{x | x = k + \frac{1}{p}, k \in \mathbb{Z}\}$

۵. الف) $y = \frac{r}{\sin x - 1} \Rightarrow \sin x \neq 1 \Rightarrow D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}\}$

ب) $y = \frac{r}{r \sin^2 x - 1} \Rightarrow \sin^2 x \neq \frac{1}{r} \Rightarrow \sin x \neq \pm \frac{\sqrt{r}}{r}$

$D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}\}$

$$\text{ا) } y = \sqrt{x \sin x - 1} \Rightarrow x \sin x - 1 \geq 0 \Rightarrow x \sin x \geq 1$$

$$\text{ب) } y = \sqrt{\cos x - 1} \Rightarrow \cos x = 1 \Rightarrow D_f = \{2k\pi\}$$

Ⓟ ✓

x	-2	-1
$x^2 + 2x + 1$	$+$	$+$

x	-3	0
$x^2 + 3x$	$+$	$+$

$$\text{ا) } \cos y = |x| - 3 \Rightarrow -1 \leq |x| - 3 \leq 1 \Rightarrow 2 \leq |x| \leq 4$$

$$\Rightarrow \begin{cases} 2 \leq x \leq 4 \\ -4 \leq x \leq -2 \end{cases} \quad D_f = [2, 4] \cup [-4, -2]$$

Ⓟ ✓

$$\text{ب) } y = \arcsin(x^2 + 3x + 1) \Rightarrow -1 \leq x^2 + 3x + 1 \leq 1 \Rightarrow D_f = [-3, -1] \cup [-1, 0]$$

$$\text{ا) } y = \sqrt{1 - \log_3(x-2)} \Rightarrow 1 - \log_3(x-2) \geq 0 \Rightarrow \log_3(x-2) \leq 1$$

$$\Rightarrow x - 2 \leq 9 \Rightarrow x \leq 11$$

$$D_f = (2, 11]$$

$$\text{II } x - 2 > 0 \Rightarrow x > 2$$

$$\text{ب) } y = \log(x^3 - x) \Rightarrow x(x-1)(x+1) > 0$$

x	-1	0	1
$x^3 - x$	$-$	$+$	$+$

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

$$\text{ا) } y = \frac{x}{x^2 + 1} \Rightarrow D_f = \mathbb{R}$$

$$\text{ب) } y = \frac{x}{x^2 - 1} \Rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1 \Rightarrow D_f = \mathbb{R} - \{\pm 1\}$$

Ⓟ ✓

$$\text{ج) } y = \frac{x}{x^2 - 2} \Rightarrow x^2 \neq 2 \Rightarrow x \neq \pm \sqrt{2} \Rightarrow D_f = \mathbb{R} - \{\pm \sqrt{2}\}$$

$$\text{د) } y = \frac{x}{x^2 - 3} \Rightarrow x^2 \neq 3 \Rightarrow D_f = \mathbb{R} - \{\pm \sqrt{3}\}$$

$$\text{ا) } y = (x+1)! \Rightarrow x+1 \in \mathbb{N} \Rightarrow D_f = \{x | x = k-1\}$$

$$\text{و } k \in \mathbb{N}$$

Ⓟ ✓

$$\text{ب) } y = \left(\frac{x^2 - 2}{x^2 - 5}\right)! \Rightarrow \frac{x^2 - 2}{x^2 - 5} \in \mathbb{N} \Rightarrow D_f = \{x | x = \frac{5k-2}{k-3}\}$$

$$\text{و } k \in \mathbb{N}$$