

الف) $\frac{\sin x - 2}{2 \cos x + 1} \Rightarrow 2 \cos x + 1 \neq 0 \Rightarrow \cos x \neq -\frac{1}{2} \quad D_f = \mathbb{R} - \left\{ 2k\pi + \frac{2\pi}{3}, 2k\pi + \frac{4\pi}{3} \right\}$

(۲) ✓

ب) $\frac{\sin x + 3}{\cos x - 1} \Rightarrow \cos x \neq 1 \Rightarrow D_f = \mathbb{R} - \{2k\pi\}$

الف) $\frac{2 \sin x + 1}{\tan x + 1} \rightarrow \frac{\sin x}{\cos x} + 1 \neq 0 \Rightarrow \sin x \neq -\cos x \quad D_f = \mathbb{R} - \left\{ k\pi - \frac{\pi}{4}, k\pi + \frac{3\pi}{4} \right\}$
 $\cos x \neq 0$

(۲) ✓

ب) $\frac{\cos x + 1}{\cot(x-1)} \rightarrow \frac{\cos x}{\sin x} + 1 \neq 0 \Rightarrow \cos x \neq -\sin x \quad D_f = \mathbb{R} - \left\{ k\pi + \frac{\pi}{4}, k\pi + \frac{5\pi}{4} \right\}$
 $\sin x \neq 0$

الف) $\sin x = x^2 - 2 \quad -1 \leq \sin x \leq 1 \Rightarrow -1 \leq x^2 - 2 \leq 1 \Rightarrow -1 \leq x^2 - 2 \Rightarrow 1 \leq x^2 \Rightarrow |x| \geq 1$
 $x^2 - 2 \leq 1 \Rightarrow x^2 \leq 3 \Rightarrow -\sqrt{3} \leq x \leq \sqrt{3}$
 $D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

(۲) ✓

ب) $y = \arccos(\sqrt{x} - 2) \quad -1 \leq \sqrt{x} - 2 \leq 1 \Rightarrow -1 \leq \sqrt{x} - 2 \Rightarrow 1 \leq \sqrt{x} \Rightarrow \sqrt{x} \leq 1 \Rightarrow x \leq 1$
 $\sqrt{x} - 2 \leq 1 \Rightarrow \sqrt{x} \leq 3 \Rightarrow x \leq 9$
 $D_f = [1, 9]$

الف) $\cos y = |x| - 2 \quad -1 \leq |x| - 2 \leq 1 \Rightarrow 1 \leq |x| \Rightarrow 1 \leq x \text{ or } -1 \geq x$
 $-4 \leq x \leq -1 \text{ or } 1 \leq x \leq 3$
 $D_f = [-4, -1] \cup [1, 3]$

(۱، ۵)

ب) $y = \arcsin(x^2 + 2x + 1) \quad -1 \leq x^2 + 2x + 1 \leq 1 \Rightarrow 0 \leq x^2 + 2x + 2 \Rightarrow 0 \leq (x+1)^2 + 1$
 $x^2 + 2x \leq 0 \Rightarrow x(x+2) \leq 0 \Rightarrow -2 \leq x \leq 0$
 $D_f = [-2, 0]$

الف) $\log_2 x = x^2 - 4 \quad x^2 - 4 > 0 \Rightarrow x^2 > 4 \Rightarrow x > 2 \text{ or } x < -2$
 $D_f = (-\infty, -2) \cup (2, +\infty)$

(۱، ۵)

ب) $y = \log_2(2 - |x|) \quad 2 - |x| > 0 \Rightarrow 2 > |x| \Rightarrow -2 < x < 2$
 $D_f = (-2, 2)$

$$\text{الف) } y = \log_{x-c}^{x-c}$$

$$\begin{aligned} x-c > 0 \Rightarrow x > c \\ x-c > 0 \Rightarrow x > c, x \neq 1 \end{aligned}$$

$$D_f = (c, \infty) - \{1\}$$

$$(1, \infty)$$

$$\begin{aligned} x-1 &\neq 1 \\ x &\neq 2 \end{aligned}$$

$$\text{ب) } y = \log_{x+c}^{x-1}$$

$$x-1 > 0 \Rightarrow x > 1$$

$$D_f = (-3, -1) \cup (1, +\infty) - \{1\}$$

$$x+c > 0 \Rightarrow x > -c, x \neq 1$$

$$\text{الف) } y = \frac{x^2-5x+6}{x-c}$$

$$\frac{x^2-5x+6}{x-c} \rightarrow (x-1)(x-6)$$

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

$$\text{ب) } y = \frac{x+c}{x-1}$$

$$\begin{aligned} \frac{x+c}{x-1} \rightarrow x=c \\ x-1 > 0 \Rightarrow x > 1 \\ x+c \neq 0 \Rightarrow x \neq -c \end{aligned}$$

$$\frac{-3}{1-1} + \frac{2}{1-1}$$

$$D_f = (-5, -2) \cup (2, +\infty) - \{-1\}$$

$$\text{الف) } \sqrt{x-2} = \log_y(x-1) \rightarrow x-2 > 0 \Rightarrow x > 2$$

$$D_f = (2, 10]$$

$$(2, 10]$$

$$\text{ب) } y = \log(2 \log_x x - 1)$$

$$2 \log_x x - 1 > 0 \Rightarrow \log_x x > \frac{1}{2} \Rightarrow x > \sqrt{x}$$

$$x > 0$$

$$D_f = (\sqrt{e}, +\infty)$$

$$\text{الف) } \frac{x}{x+1} \rightarrow x+1 \neq 0 \Rightarrow x \neq -1$$

$$D_f = \mathbb{R}$$

$$\text{ب) } y = \frac{x}{x-1} \rightarrow x-1 \neq 0 \Rightarrow x \neq 1$$

$$D_f = \mathbb{R} - \{1\}$$

$$\text{ج) } y = \frac{x}{x-2} \rightarrow x-2 \neq 0 \Rightarrow x \neq 2 \Rightarrow x \neq \frac{1}{2} \Rightarrow x \neq \frac{1}{2}$$

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

$$\text{د) } y = \frac{x}{x-3} \rightarrow x-3 \neq 0 \Rightarrow x \neq 3 \Rightarrow \log_x x \neq 3$$

$$D_f = \mathbb{R} - \{\log_x x\}$$

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

$$D_f = \{x | x = \frac{k-1}{1}, k \in \mathbb{N}\}$$

$$(2, 10]$$

$$\text{ب) } y = \left(\frac{x-2}{x-5}\right)! \rightarrow \frac{x-2}{x-5} \in \mathbb{N} \Rightarrow \frac{0 \cdot \mathbb{N} - 2}{1 \cdot \mathbb{N} - 5} = x$$

$$D_f = \{x | x = \frac{0 \cdot k - 2}{1 \cdot k - 5}, k \in \mathbb{N}\}$$