

$$۱) \text{ الف) } \frac{\sin x - 2}{x - 2 \cos x + 1} = 2 \cos x + 1 \neq 0 \quad \cos x \neq -\frac{1}{2} \quad Df = \mathbb{R} - \left\{ 2K\pi + \frac{2\pi}{3}, 2K\pi + \frac{4\pi}{3} \right\}$$

$$\text{ب) } y = \frac{\sin x + 2}{\cos x - 1} = \cos x - 1 \neq 0 \quad \cos x \neq 1 \quad Df = \mathbb{R} - \{ 2K\pi \}$$

$$۲) \text{ الف) } y = \frac{2 \sin x + 1}{\tan x + 1} = \tan x + 1 \neq 0 \quad \tan x \neq -1$$

$$Df = \mathbb{R} - \left\{ 2K\pi + \frac{\pi}{4}, 2K\pi + \frac{5\pi}{4}, 2K\pi + \frac{3\pi}{4}, 2K\pi + \frac{7\pi}{4} \right\}$$

$$\text{ب) } y = \frac{\cos x + 1}{\cot x - 1} = \cot x - 1 \neq 0 \quad \cot x \neq 1$$

$$Df = \mathbb{R} - \left\{ 2K\pi, 2K\pi + \frac{\pi}{2}, 2K\pi + \pi, 2K\pi + \frac{3\pi}{2} \right\}$$

$$۳) \text{ الف) } \sin y = x^2 - 2 \quad -1 \leq x^2 - 2 \leq 1 \quad 1 \leq x^2 \leq 3 \quad 1 \leq x \leq \sqrt{3}$$

$$Df = [1, \sqrt{3}]$$

$$\text{ب) } y = \arccos(\sqrt{x} - 2) \quad -1 \leq \sqrt{x} - 2 \leq 1 \quad \begin{cases} x \geq 0 \\ 2 \leq \sqrt{x} \leq 4 \rightarrow 4 \leq x \leq 16 \end{cases}$$

$$\rightarrow Df = [4, 16]$$

$$۴) \text{ الف) } \cos y = |x| - 3 \quad -1 \leq |x| - 3 \leq 1 \quad 2 \leq |x| \leq 4 \quad Df = [-4, -2] \cup [2, 4]$$

$$\text{ب) } y = \arcsin(x^2 + 3x + 1) \quad -1 \leq x^2 + 3x + 1 \leq 1 \rightarrow -2 \leq x(x+3) \leq 0$$

$$\begin{cases} x^2 + 3x \leq 0 \rightarrow 0, -3 \\ 0 \leq x^2 + 3x + 2 \rightarrow -2, -1 \end{cases} \rightarrow -3 \leq x \leq 0 \cup -2 \leq x \leq 1$$

$$\rightarrow Df = [-3, 0]$$

$$۵) \text{ الف) } y = \log \frac{x^2 - 4}{3} \quad \begin{cases} x^2 - 4 > 0 \rightarrow x^2 > 4 \\ 3 > 0 \quad 3 \neq 1 \end{cases} \quad \begin{cases} x > 2 \\ -2 < x \end{cases}$$

$$Df = (-\infty, -2) \cup (2, +\infty)$$

$$\text{ب) } y = \log \frac{2 - |x|}{2} \quad \begin{cases} 2 - |x| > 0 \quad 2 > |x| \\ 2 > 0 \quad 2 \neq 1 \end{cases} \quad Df = (-2, 2)$$

$$4) \text{ الف) } y = \log \frac{x-2}{x-3} \quad \begin{cases} x-2 > 0 & x > 2 \\ x-3 > 0 & x > 3 \\ x-2 \neq 1 & x \neq 3 \end{cases} \quad Df = (2, 3) - \{3\}$$

$$\text{ب) } y = \log \frac{x^2-1}{x+2} \quad \begin{cases} x^2-1 > 0 & x^2 > 1 \rightarrow \begin{cases} x > 1 \\ x < -1 \end{cases} \\ x+2 > 0 & x > -2 \\ x+2 \neq 1 & x \neq -1 \end{cases} \quad Df = (-2, -1) \cup (1, +\infty) - \{-1\}$$

$$5) \text{ الف) } y = \log \frac{x^2-5x+2}{x-2} \quad \frac{x^2-5x+2}{x-2} \rightarrow 1, 2 \quad \begin{array}{c} 1 \quad 2 \\ - \quad + \quad + \end{array}$$

$$Df = [1, 2) \cup (2, +\infty) \stackrel{!}{=} [1, +\infty) \rightarrow \text{مستبعد}$$

$$\text{ب) } y = \log \frac{x+2}{x-2} \quad \begin{cases} \frac{x+2}{x-2} > 0 & -2, 2 \\ x+2 > 0 & x > -2 \\ x+2 \neq 1 & x \neq -3 \end{cases} \quad \begin{array}{c} -2 \quad 2 \\ + \quad - \quad + \end{array}$$

$$Df = (-2, -3] \cup (2, +\infty) - \{-3\}$$

$$1) \text{ الف) } y = \sqrt{2 - \log_2(x-2)} \quad = 2 - \log_2(x-2) \geq 0 \rightarrow 2 \geq \log_2(x-2) \rightarrow x-2 \leq 1$$

$$Df = (-\infty, 1.0] \quad x \leq 1.0 \leftarrow$$

$$\text{ب) } y = \log(2 \log_2 x - 1) \quad x > 0$$

$$x \log_2 x > \frac{1}{2} \rightarrow x > \sqrt{2} \quad Df = (\sqrt{2}, +\infty)$$

$$9) \text{ الف) } y = \frac{2}{x^2+1} \rightarrow x^2+1 \neq 0 \quad x \neq -1 \quad Df = \mathbb{R}$$

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

$$\text{ج) } y = \frac{2}{x-2} \rightarrow x-2 \neq 0 \quad x \neq 2 \quad x \neq \log_2 2 \quad Df = \mathbb{R} - \{\log_2 2\}$$

$$\text{د) } y = \frac{2}{x-3} \rightarrow x-3 \neq 0 \quad x \neq 3 \quad x \neq \log_2 3 \quad Df = \mathbb{R} - \{\log_2 3\}$$

$$10) \text{ الف) } (x+1)! \quad x+1 \in \mathbb{W} \quad x \in \mathbb{W} - \frac{1}{e} \quad Df = \{x/x = K - \frac{1}{e}, K \in \mathbb{W}\}$$

$$\text{ب) } \left(\frac{x-2}{x-3}\right)! \quad \frac{x-2}{x-3} \in \mathbb{W} \rightarrow \begin{aligned} x-2 &= 2xW - 2W \\ 2x - 2xW &= 2 - 2W \end{aligned} \rightarrow x = \frac{2-2W}{2-2W}$$

$$Df = \{x/x = \frac{2K-2}{2K-2}, K \in \mathbb{W}\}$$