

الف) $y = \frac{\sin x - 2}{2\cos x + 1}$ $2\cos x + 1 \neq 0 \rightarrow 2\cos x \neq -1 \rightarrow \cos x \neq -\frac{1}{2}$ $\Rightarrow D_f = \mathbb{R} - \{2k\pi \pm \pi \pm \frac{\pi}{3}\} \text{ یا } \mathbb{R} - \{2k\pi \pm \frac{2\pi}{3}\}$	ب) $y = \frac{\sin x + 3}{\cos x - 1}$ $\cos x - 1 \neq 0 \rightarrow \cos x \neq 1$ $\Rightarrow D_f = \mathbb{R} - \{2k\pi\}$	۱
الف) $y = \frac{2\sin x + 1}{\tan x + 1}$ $\begin{cases} \tan x + 1 \neq 0 \rightarrow \tan x \neq -1 \rightarrow x \neq k\pi - \frac{\pi}{4} \\ \cos x \neq 0 \rightarrow x \neq k\pi + \frac{\pi}{2} \end{cases}$ $\Rightarrow D_f = \mathbb{R} - \{k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{2}\}$	ب) $y = \frac{\cos x + 1}{\cot x - 1}$ $\begin{cases} \cot x - 1 \neq 0 \rightarrow \cot x \neq 1 \rightarrow x \neq k\pi + \frac{\pi}{4} \\ \sin x \neq 0 \rightarrow x \neq k\pi \end{cases}$ $\Rightarrow D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}\}$	۲
الف) $\sin y = x^2 - 2$ $-1 \leq x^2 - 2 \leq 1$ $0 \leq x^2 \leq 3$ $\begin{cases} 0 \leq x \leq \sqrt{3} \text{ I} \\ 0 \leq x \leq -\sqrt{3} \text{ II} \end{cases}$ $D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$ $\Rightarrow D_f = \text{I} \cup \text{II} = [-\sqrt{3}, \sqrt{3}]$	ب) $y = \arccos(\sqrt{x} - 3)$ $\begin{cases} \sqrt{x} - 3 \geq -1 \\ -1 \leq \sqrt{x} - 3 \leq 1 \\ 0 \leq \sqrt{x} \leq 2 \end{cases}$ $\Rightarrow D_f = \text{I} \cap \text{II} = [0, 14]$ $D_f = [0, 14]$	۳
الف) $\cos y = x - 3$ $-1 \leq x - 3 \leq 1$ $0 \leq x \leq 4$ $\begin{cases} 0 \leq x \leq 4 \text{ I} \\ 0 \leq x \leq -4 \text{ II} \end{cases}$ $D_f = [-4, -2] \cup [2, 4]$ $\Rightarrow D_f = \text{I} \cup \text{II} = [-4, 4]$	ب) $y = \arcsin(x^2 + 3x + 1)$ $-1 \leq x^2 + 3x + 1 \leq 1$ $\begin{cases} x^2 + 3x + 1 \leq 1 \rightarrow x^2 + 3x \leq 0 \rightarrow x(x+3) \leq 0 \text{ I} \\ x^2 + 3x + 1 \geq -1 \rightarrow x^2 + 3x + 2 \geq 0 \rightarrow (x+1)(x+2) \geq 0 \text{ II} \end{cases}$ $\begin{matrix} x & -3 & -1 & 0 & 1 \\ & + & - & - & + \end{matrix} \text{ I} \quad \begin{matrix} x & -2 & -1 & 0 & 1 \\ & + & - & - & + \end{matrix} \text{ II}$ $\Rightarrow D_f = \text{I} \cap \text{II} = [-2, -1] \cup [0, 1]$	۴
الف) $y = \log_3 \frac{x^2 - 4}{x}$ $x^2 - 4 > 0 \rightarrow x^2 > 4 \rightarrow \begin{cases} x > 2 \\ x < -2 \end{cases}$ $\Rightarrow D_f = (-\infty, -2) \cup (2, +\infty)$	ب) $y = \log_2 \frac{2 - x }{x}$ $2 - x > 0 \rightarrow x < 2 \rightarrow -2 < x < 2$ $\Rightarrow D_f = (-2, 2)$	۵

الف) $y = \log_{x-3}^{a-x}$ $\begin{cases} a-x > 0 \rightarrow x < a \\ x-3 > 0 \rightarrow x > 3 \\ x-3 \neq 1 \rightarrow x \neq 4 \end{cases} \Rightarrow D_f = (3, a) - \{4\}$	ب) $y = \log_{x+3}^{x^2-1}$ $\begin{cases} x^2-1 > 0 \rightarrow (x+1)(x-1) > 0 \\ x+3 > 0 \rightarrow x > -3 \\ x+3 \neq 1 \rightarrow x \neq -2 \end{cases} \Rightarrow D_f = (-\infty, -1] \cup (-2, +\infty) - \{-2\}$		
الف) $y = \log_{x-3} \frac{x^2-4x+3}{x-3}$ $\frac{x^2-4x+3}{x-3} > 0 \rightarrow \frac{(x-1)(x-3)}{x-3} > 0 \rightarrow x-1 > 0 \rightarrow x > 1$ $x-3 \neq 0 \rightarrow x \neq 3$ $\Rightarrow D_f = (1, +\infty) - \{3\}$	ب) $y = \log_{x+5} \frac{x+3}{x-2}$ $\frac{x+3}{x-2} > 0 \rightarrow x > 2$ $x-2 \neq 0 \rightarrow x \neq 2$ $x+5 > 0 \rightarrow x > -5$ $x+5 \neq 1 \rightarrow x \neq -4$ $\Rightarrow D_f = (-5, -4) \cup (2, +\infty) - \{2\}$		
الف) $y = \sqrt{3 - \log_2(x-2)}$ $3 - \log_2(x-2) \geq 0 \rightarrow \log_2(x-2) \leq 3 \rightarrow x-2 \leq 8 \rightarrow x \leq 10$ $x-2 > 0 \rightarrow x > 2$ $\Rightarrow D_f = (2, 10]$	ب) $y = \log_2(\log_2^x - 1)$ $\log_2^x > 1 \rightarrow \log_2 x > 1 \rightarrow x > 2$ $\Rightarrow D_f = (2, +\infty)$		
الف) $y = \frac{3}{\varepsilon^x + 1}$ $\varepsilon^x + 1 \neq 0 \rightarrow \varepsilon^x \neq -1$ $x \neq \log_{\varepsilon}^{-1}$ $\Rightarrow D_f = \mathbb{R} - \{\log_{\varepsilon}^{-1}\}$	ب) $y = \frac{3}{\varepsilon^x - 1}$ $\varepsilon^x - 1 \neq 0 \rightarrow \varepsilon^x \neq 1$ $x \neq \log_{\varepsilon}^1$ $\Rightarrow D_f = \mathbb{R} - \{\log_{\varepsilon}^1\}$	ج) $y = \frac{3}{\varepsilon^{x-2}}$ $\varepsilon^{x-2} \neq 0 \rightarrow \varepsilon^x \neq 2$ $x \neq \log_{\varepsilon}^2$ $\Rightarrow D_f = \mathbb{R} - \{\log_{\varepsilon}^2\}$	د) $y = \frac{3}{\varepsilon^{x-3}}$ $\varepsilon^{x-3} \neq 0 \rightarrow \varepsilon^x \neq 3$ $x \neq \log_{\varepsilon}^3$ $\Rightarrow D_f = \mathbb{R} - \{\log_{\varepsilon}^3\}$
الف) $y = (\varepsilon x + 1)!$ $\varepsilon x + 1 \in \mathbb{W}$ $\rightarrow \varepsilon x \in \mathbb{W} - 1$ $\rightarrow x \in \frac{\mathbb{W} - 1}{\varepsilon}$ $\Rightarrow D_f = \{x x = \frac{k-1}{\varepsilon}, k \in \mathbb{W}\}$	ب) $y = \left(\frac{3x-2}{2x-5}\right)!$ $\frac{3x-2}{2x-5} \in \mathbb{W}$ $\rightarrow x \in \frac{5\mathbb{W}+2}{2\mathbb{W}+3}$ $\Rightarrow D_f = \{x x = \frac{5k+2}{2k+3}, k \in \mathbb{W}\}$		