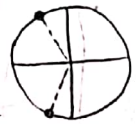


الف) $y = \frac{\sin x - 2}{2 \cos x + 1} \Rightarrow 2 \cos x + 1 \neq 0 \rightarrow \cos x \neq -\frac{1}{2} \Rightarrow x \neq 2k\pi - \frac{\pi}{3}, 2k\pi + \pi - \frac{\pi}{3}$
 $D_f = \mathbb{R} - \{2k\pi - \frac{\pi}{3}, 2k\pi + \pi - \frac{\pi}{3}\}$



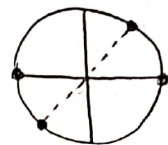
ب) $y = \frac{2 \sin x + 1}{\cos x - 1} \Rightarrow \cos x - 1 \neq 0 \rightarrow \cos x \neq 1 \Rightarrow x \neq 2k\pi$
 $D_f = \mathbb{R} - \{2k\pi\}$



الف) $y = \frac{2 \sin x + 1}{\tan x + 1} \Rightarrow \begin{cases} \cos x \neq 0 \Rightarrow x \neq k\pi + \frac{\pi}{2} \\ \tan x + 1 \neq 0 \Rightarrow \tan x \neq -1 \Rightarrow x \neq k\pi + \frac{3\pi}{4} \end{cases}$
 $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{4}\}$



ب) $y = \frac{\cos x + 1}{\cot x - 1} \Rightarrow \begin{cases} \sin x \neq 0 \Rightarrow x \neq k\pi \\ \cot x - 1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow x \neq k\pi + \frac{\pi}{4} \end{cases}$
 $D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}\}$



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

ب) $y = \arccos(\sqrt{x} - 3) \Rightarrow \begin{cases} \sqrt{x} \geq 0 \rightarrow x \geq 0 \\ -1 \leq \sqrt{x} - 3 \leq 1 \rightarrow 2 \leq \sqrt{x} \leq 4 \rightarrow 4 \leq x \leq 16 \end{cases}$
 $D_f = \star \cap \star \star \Rightarrow D_f = [4, 16]$

الف) $\cos y = |x| - 3 \Rightarrow -1 \leq |x| - 3 \leq 1 \rightarrow 2 \leq |x| \leq 4 \rightarrow \begin{cases} 2 \leq x \leq 4 \\ -2 \leq x \leq -4 \end{cases}$
 $D_f = [2, 4] \cup [-4, -2]$

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

الف) $y = \log_3 x^2 - 2 \Rightarrow \begin{cases} x^2 - 2 > 0 \rightarrow x^2 > 2 \rightarrow \begin{cases} x > \sqrt{2} \\ x < -\sqrt{2} \end{cases} \\ 3 > 0 \checkmark \\ 3 \neq 1 \checkmark \end{cases} \Rightarrow D_f = (-\infty, -\sqrt{2}) \cup (\sqrt{2}, +\infty)$

ب) $y = \log_2 |x-1| \Rightarrow \begin{cases} |x-1| > 0 \rightarrow x > 1 \text{ or } x < 1 \rightarrow -1 < x < 1 \\ x > 0 \checkmark \\ x \neq 1 \checkmark \end{cases}$
 $D_f = (-1, 1)$

الف) $y = \log_{a-x} \frac{a-x}{x-3}$ $\begin{cases} a-x > 0 \rightarrow x < a \\ x-3 > 0 \rightarrow x > 3 \\ x-3 \neq 1 \rightarrow x \neq 4 \end{cases}$ $D_f = (3, a) - \{4\}$

ب) $y = \log_{x+3} \frac{x^2-1}{x-3}$ $\begin{cases} x^2-1 > 0 \rightarrow x > 1 \\ x+3 > 0 \rightarrow x > -3 \\ x+3 \neq 1 \rightarrow x \neq -4 \end{cases} \rightarrow \begin{cases} x > 1 \\ x < -1 \end{cases} \Rightarrow (-\infty, -1) \cup (1, +\infty)$

$\rightarrow D_f = (-3, -1) \cup (1, +\infty) - \{4\}$

الف) $y = \log \frac{x^2-5x+3}{x-3} \Rightarrow \frac{x^2-5x+3}{x-3} > 0 \rightarrow \frac{(x-3)(x-1)}{x-3} > 0 \rightarrow \frac{1}{-0} + \frac{3^*}{-0} +$

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

ب) $y = \log \frac{x+3}{x-3}$ $\begin{cases} x-3 \neq 0 \rightarrow x \neq 3 \\ \frac{x+3}{x-3} > 0 \rightarrow \mathbb{R} - \{3\} \\ x+3 > 0 \rightarrow x > -3 \\ x+3 \neq 1 \rightarrow x \neq -4 \end{cases}$ $D_f = (-\infty, +\infty) - \{3\}$
 $(-3, -4) \cup (3, +\infty) - \{3\}$

الف) $y = \sqrt{3 - \log_2(x-2)}$ $\Rightarrow 3 - \log_2(x-2) \geq 0 \rightarrow \log_2(x-2) \leq 3 \rightarrow x-2 \leq 8 \rightarrow x \leq 10$
 $\begin{cases} (x-2) > 0 \rightarrow x > 2 \\ 2 > 0 \checkmark \\ 2 \neq 1 \checkmark \end{cases}$ $D_f = 2 < x \leq 10 = (2, 10]$

ب) $y = \log(x \log_3 x - 1)$ $\begin{cases} x > 0 \\ x \log_3 x - 1 > 0 \rightarrow \log_3 x > \frac{1}{x} \rightarrow x > 3^{\frac{1}{x}} \rightarrow x > \sqrt[3]{3} \end{cases}$
 $D_f = (\sqrt[3]{3}, +\infty)$

الف) $y = \frac{3}{e^x + 1} \rightarrow e^x + 1 \neq 0 \rightarrow e^x \neq -1 \rightarrow D_f = \mathbb{R}$

ب) $y = \frac{3}{e^x - 1} \rightarrow e^x - 1 \neq 0 \rightarrow e^x \neq 1 \rightarrow x \neq 0 \rightarrow D_f = \mathbb{R} - \{0\}$

ج) $y = \frac{3}{e^x - 2} \rightarrow e^x - 2 \neq 0 \rightarrow e^x \neq 2 \rightarrow x \neq \log_2 2 \rightarrow D_f = \mathbb{R} - \{\log_2 2\}$

د) $y = \frac{3}{e^x - 3} \rightarrow e^x - 3 \neq 0 \rightarrow e^x \neq 3 \rightarrow x \neq \log_2 3 \rightarrow D_f = \mathbb{R} - \{\log_2 3\}$

الف) $y = (ex + 1)! \Rightarrow ex + 1 \in \mathbb{W} \rightarrow x \in \frac{\mathbb{W} - 1}{e}$

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

ب) $y = \left(\frac{3x-2}{2x-5}\right)! \Rightarrow \frac{3x-2}{2x-5} \in \mathbb{W} \rightarrow 3x-2 = 2x\mathbb{W} - 5\mathbb{W} \rightarrow 3x-2x\mathbb{W} = 2-5\mathbb{W}$

$D_f = \{x | x = \frac{2-5k}{3-2k}, k \in \mathbb{W}\}$

$\rightarrow x(3-2\mathbb{W}) = 2-5\mathbb{W}$
 $\rightarrow x = \frac{2-5\mathbb{W}}{3-2\mathbb{W}}$