

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



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

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

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

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

x	$-\sqrt{3}$	-1	1	$\sqrt{3}$	x
	$\sqrt{}$	$ $	$ $	$\sqrt{}$	
	1	-1	-1	1	

$D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

ب) $y = \arccos(\sqrt{x} - 3) \rightarrow -1 \leq \sqrt{x} - 3 \leq 1 \rightarrow 2 \leq \sqrt{x} \leq 4 \Rightarrow 4 \leq x \leq 16 \rightarrow D_f [4, 16]$

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

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

x	-3	-2	-1	0	x
	$\sqrt{}$	$ $	$ $	$\sqrt{}$	
	1	-1	-1	1	

$\Rightarrow D_f = [-3, -2] \cup [-1, 0]$

الف) $y = \log_{\frac{1}{3}} x^2 - 4 \rightarrow x^2 - 4 > 0 \rightarrow (x-2)(x+2) > 0 \Rightarrow D_f = (-\infty, -2) \cup (2, +\infty)$

x	-2	2
	$+$	$-$
	$+$	$+$

ب) $y = \log_{\frac{1}{2}} |x| \rightarrow 2 - |x| > 0 \rightarrow |x| < 2 \Rightarrow -2 < x < 2 \rightarrow D_f = (-2, 2)$

الف) $y = \log_{x-3} \omega - x \rightarrow \omega - x > 0 \rightarrow x < \omega, x - 3 > 0, x - 3 \neq 1 \rightarrow x > 3, x \neq 4 \Rightarrow D_f = (3, 4) \cup (4, \omega) = (3, \omega) - \{4\}$

ب) $y = \log_{x+3} x^2 - 1 \rightarrow x^2 - 1 > 0 \rightarrow (x+1)(x-1) > 0, x+3 > 0, x+3 \neq 1 \rightarrow x > -3, x \neq -2 \Rightarrow D_f = (-3, -2) \cup (-2, -1) \cup (1, +\infty) = (-3, -1) \cup (1, +\infty) - \{-2\}$

x	-3	-2	-1	1
	$+$	$+$	$-$	$+$
	$+$	$+$	$-$	$+$

الف) $y = \log_{\frac{x^2-4x+3}{x-3}} \rightarrow \frac{x^2-4x+3}{x-3} > 0 \rightarrow \frac{(x-1)(x-3)}{x-3} > 0 \Rightarrow D_f = (1, 3) \cup (3, +\infty) = (1, +\infty) - \{3\}$

x	1	3
	$+$	$-$
	$+$	$+$

ب) $y = \log_{x+5} \frac{x+3}{x-2} \rightarrow \frac{x+3}{x-2} > 0, x+5 > 0, x+5 \neq 1 \rightarrow x > -5, x \neq -4 \Rightarrow D_f = (-5, -4) \cup (-4, -3) \cup (2, +\infty) = (-5, -3) \cup (2, +\infty) - \{-4\}$

x	-5	-4	-3	2
	$+$	$+$	$-$	$+$
	$+$	$+$	$-$	$+$

الف) $y = \sqrt{3 - \log_{\frac{1}{2}} x^2 - 4} \rightarrow 3 - \log_{\frac{1}{2}} x^2 - 4 \geq 0 \rightarrow 3 \geq \log_{\frac{1}{2}} x^2 \rightarrow 0 < x^2 \leq 1 \rightarrow 1 \geq x \geq 0 \Rightarrow D_f = (0, 1]$

ب) $y = \log(\sqrt{x} \log_{\frac{1}{2}} x - 1) \rightarrow \sqrt{x} \log_{\frac{1}{2}} x - 1 > 0 \rightarrow \log_{\frac{1}{2}} x > \frac{1}{\sqrt{x}} \rightarrow x > \sqrt{3} \Rightarrow D_f = (\sqrt{3}, +\infty)$

الف) $y = \frac{3}{x^2 + 1} \rightarrow x^2 + 1 \neq 0 \rightarrow x^2 \neq -1 \rightarrow D_f = \mathbb{R}$ ب) $y = \frac{3}{x^2 - 1} \rightarrow x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow x \neq \pm 1 \Rightarrow D_f = \mathbb{R} - \{1, -1\}$

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

الف) $y = (x+1)! \rightarrow x+1 \in \mathbb{N} \rightarrow x \in \frac{\mathbb{N}-1}{2} \Rightarrow D_f = \{x | x = \frac{k-1}{2}, k \in \mathbb{N}\}$

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