

الف) $y = \frac{\sin x - 2}{2 \cos x + 1}$

$2 \cos x + 1 \neq 0$
 $2 \cos x \neq -1$
 $\cos x \neq -\frac{1}{2} \rightarrow \text{H.P.}$
 $x \neq \{\frac{2\pi}{3}, \frac{4\pi}{3}\}$

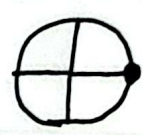
$D_f = \mathbb{R} - \{2k\pi + \frac{2\pi}{3}, 2k\pi + \frac{4\pi}{3}\}$



ب) $y = \frac{\sin x + 3}{\cos x - 1}$

$\cos x - 1 \neq 0$
 $\cos x \neq 1$
 $x \neq \{2k\pi\}$

$D_f = \mathbb{R} - \{2k\pi\}$



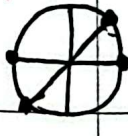
الف) $y = \frac{2 \sin x + 1}{\tan x + 1}$

$\tan x \neq -1 \rightarrow x \neq \{\frac{3\pi}{4}, \frac{7\pi}{4}\}$
 $\cos x \neq 0 \rightarrow x \neq \{\frac{\pi}{2}, \frac{3\pi}{2}\}$
 $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2}\}$



ب) $y = \frac{\cos x + 1}{\cot x - 1}$

$\cot x \neq 1 \rightarrow \frac{\cos x}{\sin x} \neq 1 \rightarrow \sin x \neq \cos x \rightarrow x \neq \{\frac{\pi}{4}, \frac{5\pi}{4}\}$
 $\sin x \neq 0 \rightarrow x \neq \{k\pi\}$
 $D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}\}$



الف) $\sin y = x^2 - 2$

$-1 \leq x^2 - 2 \leq 1$
 $1 \leq x^2 \leq 3 \rightarrow 1 \leq x \leq \sqrt{3}$
 $\text{or } -\sqrt{3} \leq x \leq -1$

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

ب) $y = \arccos(\sqrt{x-3})$

$\sqrt{x-3} \geq 0 \rightarrow x \geq 3$
 $-1 \leq \sqrt{x-3} \leq 1 \Rightarrow D_f = [3, 4]$

$3 \leq \sqrt{x} \leq 4 \rightarrow \sqrt{3} \leq \sqrt{x} \leq \sqrt{16}$
 $\sqrt{3} \leq x \leq 16$

الف) $\cos y = |x| - 3$

$-1 \leq |x| - 3 \leq 1$
 $2 \leq |x| \leq 4 \rightarrow x \leq -2 \text{ or } x \geq 2$
 $D_f = [-4, -2] \cup [2, 4]$

ب) $y = \arcsin(x^2 + 3x + 1)$

$-1 \leq x^2 + 3x + 1 \leq 1$
 $x^2 + 3x + 1 \leq 1 \rightarrow x^2 + 3x \leq 0 \rightarrow x(x+3) \leq 0 \rightarrow x \in [-3, 0]$
 $x^2 + 3x + 1 \geq -1 \rightarrow x^2 + 3x + 2 \geq 0 \rightarrow (x+1)(x+2) \geq 0 \rightarrow x \in (-\infty, -2] \cup [-1, +\infty)$
 $D_f = (-\infty, -2] \cup [-1, 0]$

الف) $y = \log_{x^2-2} x$

$x^2 - 2 > 0 \rightarrow x^2 > 2 \rightarrow x > \sqrt{2} \text{ or } x < -\sqrt{2}$
 $D_f = (-\infty, -\sqrt{2}) \cup (\sqrt{2}, +\infty)$

ب) $y = \log_{x-1} |x|$

$x - 1 > 0 \rightarrow x > 1$
 $|x| > 0 \rightarrow x \neq 0$
 $D_f = (1, +\infty)$

الف) $y = \log_{\Delta-n} \Delta-n$ $\Delta-n > 0 \rightarrow n < \Delta$ $n-3 \neq 1 \rightarrow n \neq 3$ $n-3 > 0 \rightarrow n > 3$ $D_f = (3, \Delta) - \{3\}$	ب) $y = \log_{n+3} n^2-1$ $n^2-1 > 0 \rightarrow n^2 > 1 \rightarrow \begin{cases} n > 1 \\ n < -1 \end{cases}$ $n+3 \neq 1 \rightarrow n \neq -2$ $n+3 > 0 \rightarrow n > -3$ $D_f = (-3, -1) \cup (1, +\infty) - \{-2\}$	6
الف) $y = \log \frac{n^2-3n+3}{n-3}$ $n-3 \neq 0 \rightarrow n \neq 3$ $D_f = (1, +\infty) - \{3\}$	ب) $y = \log \frac{n+3}{n-2}$ $\frac{n+3}{n-2} > 0 \rightarrow \begin{cases} n < -3 \\ n > 2 \end{cases}$ $D_f = (-\infty, -3) \cup (2, +\infty) - \{-2\}$	7
الف) $y = \sqrt{3} \log \frac{(n-2)}{2}$ $n-2 > 0 \rightarrow n > 2$ $n-2 \neq 1 \rightarrow n \neq 3$ $3 \log \frac{n-2}{2} \geq 0 \rightarrow \log \frac{n-2}{2} \leq 3 \rightarrow n \leq 10$ $D_f = (2, 10]$	ب) $y = \log (2 \log \frac{n}{3} - 1)$ $2 \log \frac{n}{3} - 1 > 0 \rightarrow 2 \log \frac{n}{3} > 1 \rightarrow \log \frac{n}{3} > \frac{1}{2} \rightarrow n > 3^{\frac{1}{2}} \rightarrow n > \sqrt{3}$ $D_f = (\sqrt{3}, +\infty)$	8
الف) $y = \frac{3}{3^n+1}$ $3^n+1 \neq 0$ $3^n \neq -1$ $D_f = \mathbb{R}$	ب) $y = \frac{3}{3^n-1}$ $3^n-1 \neq 0$ $3^n \neq 1$ $n \neq 0$ $D_f = \mathbb{R} - \{0\}$	9
ج) $y = \frac{3}{3^n-2}$ $3^n-2 \neq 0$ $3^n \neq 2$ $n \neq \frac{1}{\log_3 2}$ $D_f = \mathbb{R} - \{\frac{1}{\log_3 2}\}$	د) $y = \frac{3}{3^n-3}$ $3^n-3 \neq 0$ $3^n \neq 3$ $n \neq \log_3 3$ $D_f = \mathbb{R} - \{1\}$	10
الف) $y = (k_n+1)!$ $k_n+1 \in \mathbb{W} \rightarrow k_n \in \mathbb{W}-1$ $D_f = \{n n = \frac{k-1}{k}, k \in \mathbb{W}\}$	ب) $y = (\frac{k_n-2}{k_n-1})!$ $\frac{k_n-2}{k_n-1} \in \mathbb{W} \rightarrow k_n-2 = k_n-1 \cdot w$ $k_n-2 = k_n-1 \cdot w \rightarrow k_n-2 = k_n-1 \cdot w$ $D_f = \{n n = \frac{k-2}{k-1} k \in \mathbb{W}, k \neq 1\}$ $\hookrightarrow n = \frac{k-2}{k-1}$	11