

الف) $y = \frac{\sin \alpha - 1}{\cos \alpha + 1} \Rightarrow \cos \alpha + 1 \neq 0 \Rightarrow \cos \alpha \neq -1 \Rightarrow$
 $\cos \alpha \neq -\frac{1}{1} \Rightarrow \alpha \neq \{2k\pi + \pi, 2k\pi + \pi\}$

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

الف) $y = \frac{2 \sin \alpha + 1}{\tan \alpha}$ $\Rightarrow \begin{cases} \tan \alpha \in \mathbb{R} \Rightarrow \cos \alpha \neq 0 \Rightarrow \alpha \neq \{\frac{\pi}{2}, \frac{3\pi}{2}\} \\ \tan \alpha \neq 0 \Rightarrow \tan \alpha \neq -1 \Rightarrow \alpha \neq \{\frac{3\pi}{4}, \frac{5\pi}{4}\} \end{cases}$
 $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi - \frac{\pi}{2}\}$

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

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

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

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

ب) $y = \arcsin(\alpha^2 + 3\alpha + 1) \Rightarrow -1 \leq \alpha^2 + 3\alpha + 1 \leq 1 \Rightarrow \begin{cases} \alpha^2 + 3\alpha + 1 \leq 1 \\ \alpha^2 + 3\alpha + 1 \geq -1 \end{cases} \Rightarrow \begin{cases} \alpha^2 + 3\alpha \leq 0 \\ \alpha^2 + 3\alpha + 2 \geq 0 \end{cases}$
 $\Rightarrow \begin{cases} \alpha(\alpha + 3) \leq 0 \\ (\alpha + 1)(\alpha + 2) \geq 0 \end{cases} \Rightarrow \begin{cases} -3 \leq \alpha \leq 0 \\ \alpha \leq -2 \text{ or } \alpha \geq -1 \end{cases}$

الف) $y = \log_{\frac{1}{2}}(\alpha^2 - 4) \Rightarrow \alpha^2 - 4 > 0 \Rightarrow \alpha^2 > 4 \Rightarrow \alpha < -2 \text{ or } \alpha > 2$
 $\Rightarrow D_f = (-\infty, -2) \cup (2, +\infty)$

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

الف) $y = \log_{a-3}^{a-1} \Rightarrow \begin{cases} a-3 > 0 \\ a-3 \neq 1 \end{cases} \Rightarrow a > 3, a \neq 4 \Rightarrow D_f = (3, 4) \setminus \{4\}$ ✓

ب) $y = \log_{a+3}^{a^2-1} \Rightarrow \begin{cases} a^2-1 > 0 \\ a^2-1 \neq 1 \end{cases} \Rightarrow a^2 > 1 \Rightarrow a > 1 \vee a < -1$

$a+3 > 0, a+3 \neq 1 \Rightarrow a \neq -2$

$D_f = (-3, -1) \cup (1, +\infty) \setminus \{-2\}$ ✓

الف) $y = \log_{a-3} \frac{a^2-4a+3}{a+3} \Rightarrow \log_{a-3} \frac{(a-1)(a-3)}{a+3} > 0 \Rightarrow a-1 > 0$

$\Rightarrow a > 1 \Rightarrow D_f = (1, +\infty) \setminus \{3\}$ ✓

ب) $y = \log_{a+3} \frac{a+3}{a-2} \Rightarrow \begin{cases} a+3 > 0 \\ a+3 \neq 1 \end{cases} \Rightarrow a > -3 \vee a < -4$

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

الف) $y = \sqrt{3 - \log_2(a-2)} \Rightarrow \begin{cases} a-2 > 0 \\ 3 - \log_2(a-2) \geq 0 \end{cases} \Rightarrow a > 2, \log_2(a-2) \leq 3 \Rightarrow a-2 \leq 8 \Rightarrow a \leq 10$

$D_f = (2, 10]$ ✓

ب) $y = \log_2(\log_2^n - 1) \Rightarrow \log_2^n - 1 > 0 \Rightarrow \log_2^n > 1 \Rightarrow \log_2^n > 2^1 \Rightarrow n > \sqrt{2} \Rightarrow D_f = (\sqrt{2}, +\infty)$ ✓

الف) $y = \frac{3}{f^n+1} \Rightarrow f^n+1 \neq 0 \Rightarrow f^n \neq -1 \Rightarrow D_f = \mathbb{R}$ ✓

ب) $y = \frac{3}{f^n-1} \Rightarrow f^n-1 \neq 0 \Rightarrow f^n \neq 1 \Rightarrow n \neq 0 \Rightarrow D_f = \mathbb{R} \setminus \{0\}$ ✓

ج) $y = \frac{3}{f^n-2} \Rightarrow f^n-2 \neq 0 \Rightarrow f^n \neq 2 \Rightarrow n \neq \frac{1}{2} \Rightarrow D_f = \mathbb{R} \setminus \{\frac{1}{2}\}$ ✓

د) $y = \frac{3}{f^n-3} \Rightarrow f^n-3 \neq 0 \Rightarrow f^n \neq 3 \Rightarrow n \neq \log_2 3 \Rightarrow D_f = \mathbb{R} \setminus \{\log_2 3\}$ ✓

الف) $y = (f_n+1)!$ $\Rightarrow f_n+1 \in \mathbb{N} \Rightarrow f_n \in \mathbb{N}-1 \Rightarrow f_n \in \frac{\mathbb{N}-1}{f}$

$D_f = \{n \mid n = \frac{k-1}{f}, k \in \mathbb{N}\}$ ✓

ب) $y = (\frac{3n-2}{2n-5})!$ $\Rightarrow \frac{3n-2}{2n-5} \in \mathbb{N} \Rightarrow n = \frac{-5w+2}{2w-3}$

$\Rightarrow D_f = \{n \mid n = \frac{5k-2}{2k-3}, k \in \mathbb{N}\}$ ✓