

الف) $y = \frac{\sin \alpha - 1}{2 \cos \alpha + 1} \Rightarrow 2 \cos \alpha + 1 \neq 0 \Rightarrow \cos \alpha \neq -\frac{1}{2} \Rightarrow \alpha \neq \{2k\pi + \frac{4}{3}\pi, 2k\pi + \frac{2}{3}\pi\}$
 $\cos \alpha \neq -\frac{1}{2} \Rightarrow \alpha \neq \{2k\pi + \frac{4}{3}\pi, 2k\pi + \frac{2}{3}\pi\}$

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

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

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

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

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

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

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

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

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

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

الف) $y = \log_{a-r}^{a-r} \Rightarrow \omega - a > 0 \Rightarrow \omega > a$
 $\Rightarrow \frac{a-r}{a-r} \neq 0, a-r \neq 1 \Rightarrow a \neq r$
 $\Rightarrow a > r$
 $\Rightarrow D_f = (r, \omega) - \{r\}$

ب) $y = \log_{a+r}^{a-r} \Rightarrow a^2 - 1 > 0 \Rightarrow a^2 > 1 \Rightarrow a > 1 \vee a < -1$
 $a+r > 0, a+r \neq 1 \Rightarrow a \neq -r$

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

الف) $y = \log \frac{a^2 - 1}{a+r} \Rightarrow \log \frac{(a-1)(a+1)}{a+r} > 0 \Rightarrow a-1 > 0$
 $\Rightarrow a > 1$
 $\Rightarrow a \neq r \Rightarrow D_f = (1, +\infty) - \{r\}$

ب) $y = \log \frac{a+r}{a-r} \Rightarrow \frac{a+r}{a-r} > 0 \Rightarrow a > r \vee a < -r$
 $\frac{a+r}{a-r} \neq 1 \Rightarrow a \neq r$

$D_f = (-\infty, -r) \cup (r, +\infty) - \{r\}$
 $a+r > 0, a+r \neq 1 \Rightarrow a \neq -r$
 $\Rightarrow D_f = (-\infty, -r) \cup (r, +\infty) - \{r\}$

الف) $y = \sqrt{3 - \log_p(a-r)} \Rightarrow 3 - \log_p(a-r) > 0 \Rightarrow 3 > \log_p(a-r) \Rightarrow a-r \leq 1$
 $\Rightarrow a \leq 1$
 $D_f = (r, 1]$

ب) $y = \log_p(1 + \log_p^a - 1) \Rightarrow 1 + \log_p^a - 1 > 0 \Rightarrow 1 + \log_p^a > 1 \Rightarrow \log_p^a > 0$
 $\Rightarrow a > \sqrt{p} \Rightarrow D_f = (\sqrt{p}, +\infty)$

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

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

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

د) $y = \frac{p}{f^n-r} \Rightarrow f^n-r \neq 0 \Rightarrow f^n \neq r \Rightarrow a \neq \log_p^r \Rightarrow D_f = \mathbb{R} - \{\log_p^r\}$

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

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

ب) $y = (\frac{p(n-r)}{p(n-\omega)})! \Rightarrow \frac{p(n-r)}{p(n-\omega)} \in \mathbb{N} \Rightarrow n = -\frac{-\omega n + r}{p(n-\omega) - p}$

$D_f = \{n \mid n = \frac{\omega k - r}{p k - p}, k \in \mathbb{N}\}$