

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

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

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

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

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

ب)  $y = \arccos(\sqrt{x} - 3)$   $x \geq 0$   $1 \leq x \leq 16$  ✓  
 $-1 \leq \sqrt{x} - 3 \leq 1$   $2 \leq \sqrt{x} \leq 4$   $D_f = [4, 16]$

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

ب)  $y = \arcsin(x^2 + 3x + 1)$   $(x+1)(x+2) \geq 0$   $D_f = [-2, -1] \cup [-1, 0]$  ✓  
 $-1 \leq x^2 + 3x + 1 \leq 1$   $x^2 + 3x + 1 \geq -1 \rightarrow x^2 + 3x + 2 \geq 0$   $x^2 + 3x + 1 \leq 1 \rightarrow x^2 + 3x \leq 0 \rightarrow x(x+3) \leq 0$

الف)  $y = \log_3 \frac{x^2 - 4}{x^2}$   $\frac{x^2 - 4}{x^2} > 0$   $x^2 > 4$   $x > 2$   $x < -2$   $D_f = (-\infty, -2) \cup (2, +\infty)$  ✓

ب)  $y = \log_3 \frac{2 - |x|}{2 + |x|}$   $\frac{2 - |x|}{2 + |x|} > 0$   $2 - |x| > 0$   $|x| < 2$   $x < 2$   $x > -2$   $D_f = (-2, 2)$

الف)  $y = \log_{x-r} \omega - x$   $\omega - x > 0$   $x - r > 0$   $\begin{cases} x < \omega \\ x > r \end{cases}$   $\begin{cases} x - r \neq 1 \\ x \neq r \end{cases}$   $D_f = (r, \omega) - \{r\}$

ب)  $y = \log_{x+r} x^r - 1$   $x^r - 1 > 0$   $x^r > 1$   $\begin{cases} x > 1 \\ x < -1 \end{cases}$   $x + r > 0$   $\begin{cases} x > -r \\ x = -r \end{cases}$   $D_f = (-r, -1) \cup (1, +\infty) - \{-r\}$

الف)  $y = \log \frac{x^r - r x + r}{x - r}$   $\frac{x^r - r x + r}{x - r} > 0$   $\frac{(x-1)(x-r)}{(x-r)}$   $\frac{1}{-\phi + \phi +}$   $D_f = (1, +\infty) - \{r\}$

ب)  $y = \log \frac{x+r}{x-r}$   $\frac{x+r}{x-r} > 0$   $\frac{-r}{+\phi - \phi +}$   $x + \omega > 0$   $\begin{cases} x > -\omega \\ x \neq -r \end{cases}$   $D_f = (-\omega, -r) \cup (r, +\infty) - \{-r\}$

الف)  $y = \sqrt{r - \log_r(x-r)}$   $x \neq 0$   $\begin{cases} x > r \\ x < 1 \end{cases}$   $r - \log_r(x-r) \geq 0$   $\log_r(x-r) \leq r$   $x - r \leq r^r$   $x \leq 1 + r$   $\begin{cases} x \leq 1 \\ x \leq 1 \end{cases}$   $D_f = (r, 1]$

ب)  $y = \log(\log_r x - 1)$   $\begin{cases} x > 0 \\ x > \sqrt{r} \end{cases}$   $D_f = (\sqrt{r}, +\infty)$

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

ب)  $y = \frac{r}{r^x - r}$   $r^x - r \neq 0$   $x \neq \log_r r$   $D_f = \mathbb{R} - \{\log_r r\}$

الف)  $y = \frac{r}{r^x - 1}$   $x \neq \log_r 1$   $r^x - 1 \neq 0$   $r^x \neq 1$   $D_f = \mathbb{R} - \{\log_r 1\}$

ب)  $y = \frac{r}{r^x - r}$   $r^x - r \neq 0$   $x \neq \log_r r$   $D_f = \mathbb{R} - \{\log_r r\}$

الف)  $y = (r^x + 1)!$   $r^x + 1 \in \mathbb{W}$   $x \in \frac{\mathbb{W} - 1}{r}$   $D_f = \{x | x = \frac{k-1}{r}, k \in \mathbb{W}\}$

ب)  $y = \left(\frac{r^x - r}{r^x - \omega}\right)!$   $\frac{r^x - r}{r^x - \omega} \in \mathbb{W}$   $D_f = \{x | x = \frac{r - \omega k}{r - r k}, k \in \mathbb{W}\}$

$r^x - r = r^x \omega - \omega$   
 $r^x - r^x \omega = -\omega + r$   
 $x(r - \omega) = -\omega + r$   
 $x = \frac{-\omega + r}{r - \omega}$