

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

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

الف) $\frac{1 + \sin x}{\tan x + 1} \Rightarrow \tan x + 1 \neq 0 \Rightarrow \tan x \neq -1$
 $\Rightarrow x = \mathbb{R} - \{k\pi + \frac{\pi}{2}\} - \{k\pi + \frac{3\pi}{4}\}$

ب) $\frac{\cos x + 1}{\cot x - 1} \Rightarrow \cot x - 1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow x = \mathbb{R} - \{k\pi\} - \{k\pi + \frac{\pi}{4}\}$

الف) $\sin y = x^2 - 1 \Rightarrow -1 \leq x^2 - 1 \leq 1 \Rightarrow 0 \leq x^2 \leq 2 \Rightarrow 0 \leq x \leq \sqrt{2}$
 $x = [0, \sqrt{2}] \cup [-\sqrt{2}, 0]$

ب) $y = \arccos(\sqrt{x} - 1) \Rightarrow -1 \leq \sqrt{x} - 1 \leq 1 \Rightarrow 0 \leq \sqrt{x} \leq 2 \Rightarrow 0 \leq x \leq 4$
 $x = [0, 4]$

الف) $\cos y = |x| - 1 \Rightarrow -1 \leq |x| - 1 \leq 1 \Rightarrow 0 \leq |x| \leq 2 \Rightarrow x \in [-2, 2]$

الف) $y = \arcsin(x^2 + 2x + 1) \Rightarrow x^2 + 2x + 1 \in [-1, 1] \Rightarrow x^2 + 2x + 1 = 1 \Rightarrow (x+1)(x+2) = 1$
 $-1 \leq (x+1)(x+2) \leq 1 \Rightarrow 0 \leq (x+1)(x+2) \leq 1 \Rightarrow \frac{-2}{2} \leq x \leq \frac{0}{2} \Rightarrow x = [-2, 0]$

الف) $\log_2(x^2 - 4) \Rightarrow x^2 - 4 > 0 \Rightarrow x^2 > 4 \Rightarrow x > 2 \Rightarrow (2, +\infty) = x$
 $x < -2 \Rightarrow (-\infty, -2)$

ب) $\log_2(2 - |x|) \Rightarrow 2 - |x| > 0 \Rightarrow |x| < 2 \Rightarrow x = (-2, 2)$

$$\log_{x-2} \omega - x \Rightarrow \left. \begin{array}{l} \omega - x > 0 \quad x < \omega \\ x - 2 > 0 \Rightarrow x > 2 \\ x - 2 \neq 1 \end{array} \right\} \Rightarrow x = (\omega, \omega) - \{2\}$$

(الف)

1.15

$$\log_{x+2} x^2 - 1 \Rightarrow \left. \begin{array}{l} x^2 - 1 > 0 \quad x^2 > 1 \quad x > 1 \\ x + 2 > 0 \quad x + 2 \neq 1 \quad x > -2 \end{array} \right\} \Rightarrow x = (-2, +\infty) - \{2\}$$

(ب)

$$\log \frac{x^2 - 2x + 2}{x - 2} \Rightarrow \frac{(x-1)(x-2)}{x-2} = \frac{1}{-1 + \frac{2}{x} + 1}$$

(الف)

$$x = (1, +\infty) - \{2\}$$

2. ✓

$$\log \frac{x+2}{x+2} \quad \frac{x+2}{x-2} > 0 \rightarrow \frac{-2}{x-2} > 0 \Rightarrow x < 2$$

(ب)

$$y = \sqrt{2 - \log_r(x-2)} \Rightarrow x - 2 > 0 \Rightarrow x > 2$$

$$\log_r(x-2) \leq 2 \Rightarrow x - 2 \leq 1 \quad x \leq 10 \Rightarrow x = [2, 10]$$

(الف)

$$\checkmark \quad r \log_r x - 1 > 0 \quad \log_r x > \frac{1}{r} \Rightarrow x > \sqrt{r}$$

$$\log(r \log_r x - 1)$$

$$x = (\sqrt{r}, +\infty)$$

(ب)

$$\frac{r}{\varepsilon x + 1} \quad \varepsilon^x \neq -1 \Rightarrow x = \mathbb{R}$$

(الف)

$$\frac{r}{\varepsilon x - 1} \quad \varepsilon^x \neq 1 \Rightarrow x = \mathbb{R} - \{0\}$$

(ب)

3. ✓

$$\frac{r}{\varepsilon x - 2} \quad \varepsilon^x \neq 2 \Rightarrow x = \mathbb{R} - \{\frac{1}{r}\}$$

(ج)

$$\frac{r}{\varepsilon x - 3} \quad \varepsilon^x \neq 3 \Rightarrow x = \mathbb{R} - \{\log_r 3\}$$

(د)

$$y = (\varepsilon x + 1)! \Rightarrow \varepsilon x + 1 \in \mathbb{N} \Rightarrow \varepsilon x + 1 \geq 0 \Rightarrow \varepsilon x \geq -1 \Rightarrow x \geq -\frac{1}{\varepsilon}$$

4. ✓

$$\frac{r x - 2}{r x - \omega} \in \mathbb{N} \Rightarrow -\frac{-\omega x + 2}{r x - \omega} \Rightarrow \frac{\omega x - 2}{r x - \omega} = x$$

$$D_f = \left\{ x \mid x = \frac{\omega x - 2}{r x - \omega}, x \in \mathbb{N} \right\}$$