

$$\frac{\sin x - 1}{1 \cos x + 1} \Rightarrow 1 \cos x + 1 \neq 0 \Rightarrow 1 \cos x \neq -1 \Rightarrow \cos x \neq -\frac{1}{1}$$

$$\Rightarrow x = \mathbb{R} - \left\{ 2k\pi - \frac{\sqrt{3}\pi}{4}, 2k\pi - \frac{5\pi}{4} \right\}$$

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

(ب)

$$\frac{1 \sin x + 1}{\tan x + 1} \Rightarrow \tan x + 1 \neq 0 \Rightarrow \tan x \neq -1$$

$$\Rightarrow x = \mathbb{R} - \left\{ k\pi + \frac{\pi}{4} \right\} - \left\{ k\pi + \frac{5\pi}{4} \right\}$$

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

(ب)

$$\sin y = x^2 - 1 \Rightarrow -1 \leq x^2 - 1 \leq 1 \Rightarrow 0 \leq x^2 \leq 2 \Rightarrow 0 \leq x \leq \sqrt{2}$$

$$x = [0, \sqrt{2}]$$

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

$$x = [0, 4]$$

(ب)

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

$$x = [-2, -1] \cup [1, 2]$$

(الف)

$$y = \arcsin(x^2 + 2x + 1) \Rightarrow x^2 + 2x + 1 \in [-1, 1] \Rightarrow x^2 + 2x + 1 = 1 \Rightarrow (x+1)(x+2) = 1$$

$$-1 \leq (x+1)(x+2) \leq 1 \Rightarrow 0 \leq (x+1)(x+2) \leq 2 \Rightarrow \frac{-2}{2} \leq x \leq \frac{0}{2} \Rightarrow x = [-2, 0]$$

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$$\log_3 x^{2-4} \Rightarrow x^{2-4} > 0 \Rightarrow x^2 > 4 \Rightarrow x > 2 \Rightarrow (2, +\infty) = x$$

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$$\log_2 \frac{2-|x|}{2} \Rightarrow 2-|x| > 0 \Rightarrow |x| < 2 \Rightarrow x = (-2, 2)$$

(ب)

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

(الف)

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

(ب)

$$\log_{x-2} \frac{x^2 - 4x + 2}{x-2} \Rightarrow \frac{(x-1)(x-3)}{x-2} = \frac{1}{-1 + \frac{2}{x-2}}$$

(الف)

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

(ب)

$$\log_{x+2} \frac{x+2}{x-2} > 0 \rightarrow \frac{-2}{-1 + \frac{2}{x-2}} \Rightarrow x = (-2, -2) \cup (2, +\infty) - \{-2\}$$

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

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$$\log_r^{(x-2)} \geq 2 \Rightarrow x - 2 \geq 1 \quad x \geq 10 \Rightarrow x = [10, +\infty)$$

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

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

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

(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)

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

(ج)

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

(د)

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

$$\Rightarrow x = (-\frac{1}{\varepsilon}, +\infty)$$

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

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