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$$a) r \sin x - 1 \geq 0 \Rightarrow \sin x \geq \frac{1}{r} \Rightarrow \text{Unit Circle Diagram} \Rightarrow D_f = [rk\pi + \frac{\pi}{6}, rk\pi + \frac{5\pi}{6}]$$

Ⓟ ✓

$$b) \cos x - 1 \geq 0 \Rightarrow \cos x \geq 1 \Rightarrow \cos x = 1 \Rightarrow D_f = \{rk\pi\}$$

$-1 \leq \cos x \leq 1$

$$الف) -1 \leq |x-3| \leq 1 \Rightarrow 2 \leq |x| \leq 4 \Rightarrow \begin{cases} 2 \leq x \leq 4 \\ -4 \leq x \leq -2 \end{cases} \Rightarrow D_f = [-4, -2] \cup [2, 4]$$

Ⓟ ✓

$$b) -1 \leq x^2 + 3x + 1 \leq 1 \Rightarrow \begin{cases} (I) x^2 + 3x + 1 \leq 1 \Rightarrow x^2 + 3x \leq 0 \Rightarrow x(x+3) \leq 0 \Rightarrow 0, -3 \\ (II) x^2 + 3x + 1 \geq -1 \Rightarrow x^2 + 3x + 2 \geq 0 \Rightarrow (x+2)(x+1) \geq 0 \Rightarrow -1, -2 \end{cases}$$

(I) $\frac{-3 \pm \sqrt{9-4}}{2}$ (II) $\frac{-3 \pm \sqrt{9-4}}{2}$ $\Rightarrow D_f = [-3, -2] \cup [-1, 0]$

$$الف) 2 - \log_r(x-2) \geq 0 \Rightarrow \begin{cases} x-2 \geq 0 \Rightarrow x \geq 2 \\ \log_r(x-2) \leq 2 \Rightarrow x-2 \leq 9 \Rightarrow x \leq 11 \end{cases} \Rightarrow D_f = [2, 11]$$

Ⓟ ✓

$$b) \log_{\frac{1}{2}} x^2 - x \Rightarrow x^2 - x > 0 \Rightarrow x(x-1) > 0 \Rightarrow \frac{-1 \pm \sqrt{1+4}}{2} \Rightarrow D_f = (-1, 0) \cup (1, +\infty)$$

$$الف) r^n + 1 \neq 0 \Rightarrow r^n \neq -1 \Rightarrow x \neq \log_r(-1) \Rightarrow D_f = \mathbb{R} - \{\log_r(-1)\} \Rightarrow \mathbb{R} = D_f$$

$$ب) r^n - 1 \neq 0 \Rightarrow r^n \neq 1 \Rightarrow x \neq \log_r 1 = 0 \Rightarrow D_f = \mathbb{R} - \{0\} = \mathbb{R} - \{\log_r 1\}$$

$$ج) r^n - 2 \neq 0 \Rightarrow r^n \neq 2 \Rightarrow x \neq \log_r 2 \Rightarrow D_f = \mathbb{R} - \{\log_r 2\} \quad \text{Ⓟ ✓}$$

$$د) r^n - 3 \neq 0 \Rightarrow r^n \neq 3 \Rightarrow x \neq \log_r 3 \Rightarrow D_f = \mathbb{R} - \{\log_r 3\}$$

$$الف) rx + 1 \in \mathbb{W} \Rightarrow x = \frac{\mathbb{W}-1}{r} \Rightarrow D_f = \{x/x = \frac{k-1}{r}, k \in \mathbb{W}\}$$

Ⓟ ✓

$$ب) \frac{rx - 2}{r - 2} \in \mathbb{W} \Rightarrow rx - 2 \in (r-2)\mathbb{W} \Rightarrow rx - 2 \in \mathbb{W} \Rightarrow x(r-2) = r - 2\mathbb{W}$$

$$\Rightarrow x = \frac{r - 2\mathbb{W}}{r - 2} \Rightarrow D_f = \{x/x = \frac{r - 2k}{r - 2}, k \in \mathbb{W}\}$$