

$$1) \text{ ا) } y = \sqrt{\frac{u^2 - 4u}{u^3 - u}} \geq 0 \Rightarrow \frac{u(u-4)}{u(u^2-1)} \geq 0$$

$$\frac{u-4}{(u-1)(u+1)} \geq 0$$

$$+ = (0, 1) \quad , \quad (-1, 0)$$

$$- = (-\infty, -1)$$

$$A = [4, +\infty)$$

$$\text{منفی} = (1, 4)$$

$$D = (-1, 0) \cup (0, 1) \cup [4, +\infty)$$

$$ب) y = \sqrt{\frac{u^3 - u^2}{u^2 - u}} = \frac{u^2(u-1)}{u(u^2-1)} \geq 0 \quad u(u^2-1) \neq 0$$

$$D_f = \mathbb{R} \setminus \{-1, 0, 1\}$$

$$2) \text{ ا) } y = \frac{u+1}{\sqrt{u+1}} = u+1 > 0 \quad u \leq 0 \Rightarrow |u| = -u \Rightarrow u - u - 0 \neq 0 \times$$

$$\Rightarrow u > 0 \Rightarrow u+u = 2u > 0 \Rightarrow u > 0$$

$$D_f = (0, +\infty)$$

$$ب) \frac{1}{\sqrt{u|u|}} = u|u| > 0 \quad u \neq 0 \quad u > 0 \quad u|u| = -u^2 < 0$$

$$D_f = (0, +\infty)$$

$$3) \text{ ا) } y = \sqrt{2 - [u]} \quad 2 - [u] \geq 0 \Rightarrow [u] \leq 2$$

$$[u] \leq 2 \Rightarrow u < 3$$

$$D_f = (-\infty, 3)$$

$$ب) y = \frac{1}{\sqrt{2 - [u]}} = 2 - [u] \geq 0 \Rightarrow [u] < 2 \Rightarrow [u] \leq 1 \rightarrow u < 2$$

$$D_f = (-\infty, 2)$$

$$\text{ا) } y = \sqrt{\left[u - \frac{1}{p}\right] + \left[u + \frac{p}{p}\right]}$$

$$\left[u + \frac{p}{p}\right] = \left[u - \frac{1}{p} + 1\right] = \left[u - \frac{1}{p}\right] + 1$$

$$2\left[u - \frac{1}{p}\right] + 1 \geq 0 \Rightarrow \left[u - \frac{1}{p}\right] \geq -\frac{1}{2}$$

$$\left[u - \frac{1}{p}\right] \geq 0 \Rightarrow u - \frac{1}{p} \geq 0 \Rightarrow u \geq \frac{1}{p}$$

$$D_f = \left[\frac{1}{p}, +\infty\right)$$

$$ب) y = \sqrt{\left[u - \frac{1}{p}\right] + \left[-u + \frac{1}{p}\right]}$$

$$t = u - \frac{1}{p} \quad [t] + [-t] = \begin{cases} 0 & t \in \mathbb{Z} \\ -1 & t \notin \mathbb{Z} \end{cases}$$

$$u - \frac{1}{p} = k \in \mathbb{Z} \Rightarrow u = k + \frac{1}{p}$$

$$D_f = \left\{k + \frac{1}{p} \mid k \in \mathbb{Z}\right\}$$

Subject:

Date:

ا) $y = \frac{r}{\sin \alpha - 1} = \sin \alpha - 1 \neq 0 \Rightarrow \sin \alpha \neq 1 \Rightarrow \alpha \neq k\pi + \frac{\pi}{2} \quad (k \in \mathbb{Z})$

$D_f = \mathbb{R} \setminus \left\{ k\pi + \frac{\pi}{2} \mid k \in \mathbb{Z} \right\}$

ب) $y = \frac{r}{r \sin^2 \alpha - 1} = r \sin^2 \alpha - 1 \neq 0 \Rightarrow \cos^2 \alpha \neq 0 \Rightarrow \cos \alpha \neq 0 \Rightarrow r \alpha \neq k\pi + \frac{\pi}{2} \Rightarrow$

$\alpha \neq \frac{k\pi}{r} + \frac{\pi}{2} \quad (k \in \mathbb{Z})$

$D_f = \mathbb{R} \setminus \left\{ \frac{k\pi}{r} + \frac{\pi}{2} \mid k \in \mathbb{Z} \right\}$

ا) $y = \sqrt{r \sin \alpha - 1} \Rightarrow r \sin \alpha - 1 \geq 0 \Rightarrow \sin \alpha \geq \frac{1}{r}$

$D_f = \bigcup_{k \in \mathbb{Z}} \left[k\pi + \frac{\pi}{r}, k\pi + \frac{\pi}{r} \right]$

ب) $y = \sqrt{\cos \alpha - 1} \Rightarrow \cos \alpha - 1 \geq 0 \Rightarrow \cos \alpha \geq 1 \quad \cos \alpha \leq 1 \quad \cos \alpha = 1$

$D_f = \{ k\pi \mid k \in \mathbb{Z} \}$

ا) $\cos y = |x| - r \quad -1 \leq |x| - r \leq 1 \Rightarrow r \leq |x| \leq r$

$D = [-r, -r] \cup [r, r]$

ب) $y = \arcsin(x^2 + 3x + 1) \Rightarrow -1 \leq x^2 + 3x + 1 \leq 1$

① $x^2 + 3x + 1 \geq -1 \Rightarrow x^2 + 3x + 2 \geq 0 \Rightarrow (x+1)(x+2) \geq 0 \Rightarrow x \in (-\infty, -2] \cup [-1, +\infty)$

② $x^2 + 3x + 1 \leq 1 \Rightarrow x^2 + 3x \leq 0 \Rightarrow x(x+3) \leq 0 \Rightarrow x \in [-3, 0]$

$D_f = [-3, -2] \cup [-1, 0]$

ا) $y = \sqrt{2 - \log_3(x-2)} = x-2 > 0 \Rightarrow x > 2$

$2 - \log_3(x-2) \geq 0 \Rightarrow \log_3(x-2) \leq 2 \Rightarrow x-2 \leq 3^2 = 9 \Rightarrow x \leq 11$

$D_f = (2, 11]$

ب) $y = \log(x^3 - x) \Rightarrow x^3 - x > 0 \Rightarrow x(x-1)(x+1) > 0$

$D_f = (-1, 0) \cup (1, +\infty)$

ا) $y = \frac{x}{x^u + 1} \Rightarrow x^u > 0 \quad u \in \mathbb{R} \quad D_f = \mathbb{R}$

ب) $y = \frac{x}{x^u - 1} \Rightarrow x^u - 1 \neq 0 \Rightarrow x^u \neq 1 \Rightarrow u \neq 0$

$D_f = \mathbb{R} \setminus \{0\}$

ج) $x^u - x \neq 0 \Rightarrow x^u \neq x \Rightarrow x^u \neq 1 \Rightarrow u \neq \frac{1}{x}$

$D_f = \mathbb{R} \setminus \left\{ \frac{1}{x} \right\}$

د) $y = \frac{x}{x^u - x} \Rightarrow x^u - x \neq 0 \Rightarrow x^u \neq x \Rightarrow u \neq \log_x 3 \quad D_f = \mathbb{R} \setminus \left\{ \log_x 3 \right\}$

ا) $y = (kx+1)! \quad \exists a, k = k \quad (k \in \{0, 1, 2, \dots\}) \Rightarrow u = \frac{k-1}{x}$

$D_f = \left\{ \frac{k-1}{x} \mid k \in \mathbb{W} \right\} = \left\{ -\frac{1}{x}, 0, \frac{1}{x}, \frac{2}{x}, \dots \right\}$

ب) $y = \left(\frac{x^u - x}{x^u - x} \right)! \quad \frac{x^u - x}{x^u - x} = k \quad (k \in \mathbb{W}) \quad x^u - x = x^k x - x = x(x^{k-1} - 1) = x(x^{k-1} - 1)$
 $\Rightarrow u = \frac{k-1}{x}$

$D_f = \left\{ \frac{k-1}{x} \mid k \in \mathbb{W} \right\}$

~~$k \in \mathbb{W}$~~