

$$\text{الف) } y = \sqrt{\frac{x^2 - 4x}{x^2 - x}}$$

$$\Rightarrow \frac{x^2 - 4x}{x^2 - x} \geq 0$$

$$\Rightarrow \frac{x(x-4)}{x(x-1)} \geq 0$$

$$\rightarrow -1, 0, 4$$

$$\begin{array}{c} * \\ -1 \quad 0 \quad 1 \quad 4 \\ - \quad + \quad + \quad - \quad + \end{array}$$

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

$$\text{ب) } y = \sqrt{\frac{x^4 - x^2}{x^2 - x}}$$

$$\Rightarrow \frac{x^4 - x^2}{x^2 - x} \geq 0$$

$$\Rightarrow \frac{x^2(x^2 - 1)}{x(x - 1)} \geq 0$$

$$\rightarrow -1, 0, 1$$

$$\begin{array}{c} * \quad * \quad * \\ -1 \quad 0 \quad 1 \end{array}$$

$$+ \quad + \quad + \quad +$$

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

$$\text{الف) } y = \frac{x+1}{\sqrt{x+|x|}}$$

$$D_f = \{x \mid x \in \mathbb{R}, x > 0\}$$

$$\sqrt{x+|x|} \neq 0 \Rightarrow x+|x| \neq 0$$

$$\rightarrow x > 0$$

$$\text{ب) } y = \frac{1}{\sqrt{x|x|}}$$

$$\Rightarrow \sqrt{x|x|} \neq 0 \Rightarrow x|x| \neq 0 \Rightarrow$$

$$x \neq 0 \quad D_f = \{x \mid x \in \mathbb{R}, x \neq 0\}$$

$$\text{الف) } y = \sqrt{2 - [x]}$$

$$\rightarrow 2 - [x] \geq 0 \rightarrow [x] \leq 2$$

$$x \leq 3$$

$$1) y = \frac{1}{\sqrt{r-x}} \Rightarrow \sqrt{r-x} \neq 0 \Rightarrow r-x \neq 0$$

$$[x] \neq r \Rightarrow D_f = x \in \mathbb{R} - (r, r)$$

$$2) y = \sqrt{\left[x - \frac{1}{\mu}\right] + \left[x + \frac{r}{\mu}\right]} \Rightarrow \left[x - \frac{1}{\mu}\right] + \left[x + \frac{r}{\mu}\right] \geq 0 \quad (4)$$

$$x \geq \frac{1}{\mu} \Rightarrow x - \frac{1}{\mu} \geq 0$$

$$x + \frac{r}{\mu} \geq 0$$

$$\Rightarrow x < \frac{1}{\mu} \Rightarrow \frac{1}{\mu} > x \geq -\frac{r}{\mu} \Rightarrow x + \frac{r}{\mu} \geq 0$$

$$D = \left[\frac{1}{\mu}, +\infty\right) \quad x - \frac{1}{\mu} \geq 0 \quad \left. \begin{array}{l} \text{لغرضه} \\ \text{منه} \end{array} \right\} -1$$

$$3) \sqrt{\left[x - \frac{1}{\mu}\right] + \left[-x + \frac{r}{\mu}\right]} \Rightarrow \left[x - \frac{1}{\mu}\right] + \left[-x + \frac{r}{\mu}\right] \geq 0$$

$$x \geq \frac{1}{\mu} \Rightarrow x - \frac{1}{\mu} \geq 0 \quad -x + \frac{r}{\mu} \geq 0 \quad \text{سب}$$

$$\frac{1}{\mu} \leq x \leq \frac{r}{\mu} \Rightarrow x - \frac{1}{\mu} \geq 0 \quad -x + \frac{r}{\mu} \geq 0 \quad \text{سب}$$

$$D = \left[\frac{1}{\mu}, \frac{r}{\mu}\right]$$

$$4) y = \frac{r}{\sin x - 1} \Rightarrow \sin x - 1 \neq 0 \quad (5)$$

$$\sin x \neq 1 \Rightarrow x \neq 2k\pi, \pi$$

$$D = \mathbb{R} - \left\{ \frac{\pi}{r}, 2k\pi \mid k \in \mathbb{Z} \right\}$$

$$5) y = \frac{r}{r \sin^2 x - 1} \Rightarrow r \sin^2 x - 1 \neq 0$$

$$r \sin^2 x \neq 1 \quad \sin^2 x \neq \frac{1}{r} \quad \sin x \neq \pm \frac{\sqrt{r}}{r}$$

$$D = \mathbb{R} - \left\{ k\pi, \frac{\pi}{r} \mid k \in \mathbb{Z} \right\}$$

$$\text{الف) } y = \sqrt{r \sin x - 1} \Rightarrow r \sin x - 1 \geq 0 \quad (6)$$

$$r \sin x \geq 1 \quad \sin x \geq \frac{1}{r}$$

$$\frac{\pi}{6} \leq x \leq \frac{5\pi}{6} \Rightarrow D = [rk\pi + \frac{\pi}{6}, rk\pi + \frac{5\pi}{6}], k \in \mathbb{Z}$$

$$\text{ب) } \sqrt{\cos x - 1} \Rightarrow \cos x - 1 \geq 0 \Rightarrow \cos x \geq 1$$

$$\cos x = 1 \quad \text{or} \quad -1 < \cos x < 1$$

$$x = rk\pi \Rightarrow D = \{rk\pi \mid k \in \mathbb{Z}\}$$

$$\text{الف) } \cos y = |x| - r \quad -1 \leq \cos y \leq 1 \quad (7)$$

$$-1 \leq |x| - r \leq 1$$

$$r \leq |x| \leq r+1$$

$$-r-1 \leq x \leq -r \quad , \quad r \leq x \leq r+1 \Rightarrow D = [-r-1, -r] \cup [r, r+1]$$

$$\text{ب) } y = \arcsin(x^r + rx + 1) \Rightarrow -1 \leq x^r + rx + 1 \leq 1$$

$$x^r + rx + 1 \leq 1 \quad 0 \leq x^r + rx + 1$$

$$x^r + rx \leq 0 \quad 0 \leq (x+1)(x+r)$$

$$x(x+r) \leq 0 \quad -1 \leq -r \quad -1 \leq -r$$

$$\Rightarrow [-r, 0] \quad \cup \quad (-\infty, -r] \cup [-1, +\infty)$$

$$D = [-r, r] \cup [-1, 0]$$

$$1) \text{ a) } y = \int x \log_p(x-r) \quad x - \log_p(x-r) > 0 \quad (8)$$

$$2) \log_p(x-r) \leq x$$

$$3) x-r \leq 1 \Rightarrow x \leq 11 \Rightarrow D = \{x \mid x \leq 11\}$$

$$4) \text{ b) } y = \log(x^w - x) \Rightarrow x^w - x > 0 \Rightarrow x(x^{w-1} - 1) > 0$$

$$5) \Rightarrow D = (-1, 0) \cup (1, +\infty) \quad \begin{matrix} -1 & 0 & 1 \\ | & | & | \\ - & + & - & + \end{matrix}$$

$$7) \text{ a) } y = \frac{x^w}{x^w + 1} \Rightarrow x^w + 1 \neq 0 \Rightarrow x^w \neq -1 \quad (9)$$

$$D = \mathbb{R}$$

$$9) \text{ b) } y = \frac{x^w}{x^w - 1} \Rightarrow x^w - 1 \neq 0 \Rightarrow x^w \neq 1 \Rightarrow x \neq 0 \Rightarrow$$

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

$$11) \text{ c) } y = \frac{x^w}{x^w - r} \Rightarrow x^w - r \neq 0 \Rightarrow x^w \neq r$$

$$\left(\frac{1}{r}\right)^w \neq r \Rightarrow r^{w+1} \neq 1$$

$$\Rightarrow rx \neq 1 \Rightarrow x \neq \frac{1}{r} \Rightarrow D = \mathbb{R} \setminus \left\{\frac{1}{r}\right\}$$

$$14) \text{ d) } y = \frac{x^w}{x^w - w} \Rightarrow x^w - w \neq 0 \Rightarrow x^w \neq w \Rightarrow x \neq \log_p w$$

$$\Rightarrow D = \mathbb{R} \setminus \{\log_p w\}$$

$$16) \text{ a) } y = (n+1)! \Rightarrow f_{n+1} = 0, 1, 2, \dots \quad (10)$$

$$f_{n+1} = n \Rightarrow n = 0, 1, 2, \dots$$

$$18) f_n = n-1 \Rightarrow n = \frac{n-1}{r} \Rightarrow D = \left\{\frac{n-1}{r} \mid n \in \mathbb{N}\right\}$$

$$b) y = \left(\frac{r_n - r}{r_n - \Delta} \right) - \frac{1}{0} \Rightarrow \frac{r_n - r}{r_n - \Delta} = n \Rightarrow n = 0, 1, 2, 3, \dots$$

$$r_n - r = n(r_n - \Delta) \Rightarrow r_n - r = r_n n - \Delta n \Rightarrow r_n - r_n n = r - \Delta n$$

$$n(r_n - r) = r - \Delta n \Rightarrow n = \frac{r - \Delta n}{r_n - r} \xrightarrow{x-1} n = \frac{\Delta n - r}{r_n - r}$$

$$\Rightarrow D = \left\{ \frac{\Delta n - r}{r_n - r} \mid n \in \mathbb{N} \right\}$$