

$$y = \sqrt{r \sin n - 1} \rightarrow r \sin n - 1 \geq 0 \quad \sin n \geq \frac{1}{r} \quad D_f = \left[ rk\pi + \frac{\pi}{4}, rk\pi + \frac{3\pi}{4} \right]$$



(P) ✓

$$y = \sqrt{\cos n - 1} \quad \cos n - 1 \geq 0 \quad \cos n \geq 1 \quad D_f = \{rk\pi\}$$



الف)  $\cos y = |n| - r \quad -1 \leq |n| - r \leq 1 \Rightarrow r \leq |n| \leq r+1$

$$D_f = [-r-1, -r] \cup [r, r+1] \quad -r-1 \leq n \leq -r \quad \text{or} \quad r \leq n \leq r+1$$

$$[-r, 0] \cap D_f = [-r, -r] \cup [r, r] \quad D_f = [-r, -r] \cup [r, r] \quad (P) \checkmark$$

$y = \arcsin(n^r + r^{n+1})$   
 $-1 \leq n^r + r^{n+1} \leq 1$   
 $0 \leq n^r + r^{n+1} \leq 1 \rightarrow 0 \leq (n+r)(n+1) + 1 - 1 +$

$$y = \sqrt{r \log_r(n-r)} \quad n-r > 0 \rightarrow n > r \quad D_f = (r, 11]$$

$$r - \log_r^{n-r} \geq 0 \quad r \geq n-r \rightarrow n \leq 11$$

$$y = \log(n^r - n) \rightarrow n^r - n > 0 \rightarrow n(n^{r-1} - 1) > 0$$

Number line diagram:  $\frac{-1}{-} \quad \frac{0}{+} \quad \frac{1}{+}$  (1, +\infty) \cup (-1, 0)

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

$$y = \frac{r}{r^n + 1} \rightarrow r^n + 1 \neq 0 \quad \epsilon^n \neq -1 \Rightarrow D_f = \mathbb{R}$$

$$y = \frac{r}{r^n - 1} \rightarrow r^n - 1 \neq 0 \quad \epsilon^n \neq 1 \Rightarrow D_f = \mathbb{R} - \{0\}$$

$$y = \frac{r}{r^n - r} \rightarrow r^n - r \neq 0 \quad \epsilon^n \neq r \Rightarrow D_f = \mathbb{R} - \{\log_r r\}$$

$$y = \frac{r}{r^n - r} \rightarrow \epsilon^n - r \neq 0 \quad \epsilon^n \neq r \Rightarrow D_f = \mathbb{R} - \{\log_r r\}$$

ب)  $y = (\epsilon n + 1)!$   $\epsilon n + 1 \in \mathbb{W} \rightarrow n \in \frac{\mathbb{W} - 1}{\epsilon} \quad D_f = \{n | n = \frac{k-1}{\epsilon}, k \in \mathbb{W}\}$

(P) ✓

$$\rightarrow y_n = \left( \frac{r^n - r}{r^n - \epsilon} \right)!. \quad \frac{r^n - r}{r^n - \epsilon} \in \mathbb{W} \Rightarrow n \in \frac{-\epsilon \mathbb{W} + r}{r \mathbb{W} - r} = \frac{\epsilon \mathbb{W} - r}{r \mathbb{W} - r}$$

$$D_f = \{n | n = \frac{\epsilon k - r}{rk - r}, k \in \mathbb{W}\}$$

الف)  $y = \sqrt{\frac{x^2-4x}{x^3-x}} \rightarrow \sqrt{\frac{x(x-4)}{x(x^2-1)}} \rightarrow \sqrt{\frac{x-4}{x^2-1}}$   $\frac{-1}{-} + \frac{+}{+} + \frac{+}{+} - \frac{+}{+}$   $(-1, 0) \cup (0, 1) \cup [4, +\infty)$

ب)  $y = \sqrt{\frac{x^6-x^4}{x^3-x}} \rightarrow \sqrt{\frac{x^4(x^2-1)}{x(x^2-1)}} \rightarrow \sqrt{x^3}$   $\frac{-1}{+} + \frac{+}{+} + \frac{+}{+}$   $\mathbb{R} - \{-1, 0, 1\}$

الف)  $y = \frac{x+1}{\sqrt{x+|x|}} \rightarrow x+|x| > 0$   $\begin{matrix} + \rightarrow \checkmark \\ - \rightarrow \times \\ 0 \rightarrow \times \end{matrix}$   $\mathbb{R}^+$

ب)  $y = \frac{1}{\sqrt{x|x|}} \rightarrow x|x| > 0$   $\begin{matrix} + \rightarrow \checkmark \\ - \rightarrow \times \\ 0 \rightarrow \times \end{matrix}$   $\mathbb{R}^+$

الف)  $y = \sqrt{2-x} \rightarrow 2-x \geq 0 \Rightarrow x \leq 2 \Rightarrow (-\infty, 2]$

ب)  $y = \frac{1}{\sqrt{2-x}} \rightarrow 2-x > 0 \Rightarrow x < 2 \Rightarrow (-\infty, 2)$

الف)  $\sqrt{x-\frac{1}{x}} + \sqrt{x+\frac{2}{x}} \rightarrow \sqrt{x-\frac{1}{x}} + \sqrt{x+\frac{2}{x}} \geq 0$   $\sqrt{x+\frac{2}{x}} \geq \frac{1}{x}$   $x+\frac{2}{x} \geq 1 \Rightarrow x \geq \frac{1}{x}$   $\sqrt{x-\frac{1}{x}} + \sqrt{x+\frac{2}{x}} \geq 0 \Rightarrow \sqrt{x+\frac{2}{x}} \geq \frac{1}{x}$   $D_f = [\frac{1}{x}, +\infty)$

ب)  $\sqrt{x-\frac{1}{x}} + \sqrt{-x+\frac{1}{x}} \rightarrow \sqrt{x-\frac{1}{x}} + \sqrt{-(x-\frac{1}{x})} \geq 0 \Rightarrow x-\frac{1}{x} \geq 0 \Rightarrow x \geq \frac{1}{x} \Rightarrow x \in \mathbb{Z} + \frac{1}{x}$   $D_f = \{x | x = k + \frac{1}{x}, k \in \mathbb{Z}\}$

الف)  $y = \frac{x}{\sin x - 1} \rightarrow \sin x - 1 \neq 0 \Rightarrow \sin x \neq 1 \Rightarrow \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$   $D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$

ب)  $y = \frac{x}{x \sin^2 x - 1} \rightarrow x \sin^2 x - 1 \neq 0 \Rightarrow \sin^2 x \neq \frac{1}{x} \Rightarrow \sin x \neq \pm \frac{1}{\sqrt{x}}$   $D_f = \mathbb{R} - \{k\pi \pm \frac{\pi}{2}\}$