

$$الف) y = \sqrt{1 - \sin x}$$

$$1 - \sin x \geq 0$$

$$|\sin x| \leq 1$$

$$\sin x \in [-1, 1]$$

$$D_f = \left\{ x \mid x \in \frac{\pi}{2} + 2k\pi, \frac{3\pi}{2} + 2k\pi \right\}$$

$$ب) y = \sqrt{\cos x - 1}$$

$$\cos x - 1 \geq 0$$

$$|\cos x| \leq 1$$

$$\cos x \in [-1, 1]$$

$$D_f = \{x \mid x \in 2k\pi\}$$

$$الف) (\cos y = |x| - 3)$$

$$-1 \leq |x| - 3 \leq 1$$

$$-1 \leq |x| - 3$$

$$|x| \leq 4$$

$$x \geq -4$$

$$x \leq 4$$

$$D_f = [-4, 4] \cup [-4, -4]$$

$$|x| \leq 4$$

$$-4 \leq x \leq 4$$

$$\begin{cases} -4 \leq x^2 + 3x + 1 \\ 0 \leq (x+1)(x+2) \end{cases}$$

$$ب) y = \arcsin(x^2 + 3x + 1)$$

$$-1 \leq x^2 + 3x + 1 \leq 1$$

$$-1 \leq x^2 + 3x + 1$$

$$x^2 + 3x + 1 \leq 1$$

$$x^2 + 3x \leq 0$$

$$x(x+3) \leq 0$$

$$الف) y = \sqrt{1 - \cos(x-2)}$$

$$x-2 \geq 0 \rightarrow x \geq 2$$

$$1 - \cos(x-2) \geq 0$$

$$\rightarrow 2 \leq x \leq 4$$

$$\cos(x-2) \leq 1$$

$$x-2 \leq \pi$$

$$x \leq 2 + \pi$$

$$ب) \log(x^2 - x)$$

$$x^2 - x > 0$$

$$x(x-1) > 0 \Rightarrow \frac{-1}{-1} < x < \frac{1}{-1}$$

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

$$الف) y = \frac{x}{x^2 + 1}$$

$$x^2 + 1 \neq 0$$

$$x^2 \neq -1$$

$$D_f = \mathbb{R}$$

$$ب) y = \frac{x}{x^2 - 1}$$

$$x^2 - 1 \neq 0$$

$$x^2 \neq 1$$

$$x \neq \pm 1$$

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

$$ج) y = \frac{x}{x^2 - x}$$

$$x^2 - x \neq 0$$

$$x^2 \neq x$$

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

$$د) y = \frac{x}{x^2 - x}$$

$$x^2 - x \neq 0$$

$$x^2 \neq x$$

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

$$الف) y = (x+1)!$$

$$x+1 \in \mathbb{N}$$

$$x \in \mathbb{N} - 1$$

$$x \in \frac{n-1}{k} \quad D_f = \left\{ x \mid x = \frac{k-1}{k}, k \in \mathbb{N} \right\}$$

$$ب) \left(\frac{x^2 - 1}{x^2 - \omega} \right)!$$

$$\frac{x^2 - 1}{x^2 - \omega} \in \mathbb{N} \quad D_f = \left\{ x \mid x = \frac{x^2 - \omega}{x^2 - \omega}, x \in \mathbb{N} \right\}$$

$$x^2 - 1 = x^2 - \omega$$

$$x^2 - \omega x = 1 - \omega \rightarrow x = \frac{1 - \omega}{x}$$

$$x(x - \omega)$$

$$x^2 - \omega x$$

الف) $y = \sqrt{\frac{x^2 - 4x}{x^3 - x}}$

$\frac{x^2 - 4x}{x^3 - x} \geq 0$

$x^2 - 4x = 0 \rightarrow x(x-4) = 0 \rightarrow x = 0, 4$

$x^3 - x \neq 0 \rightarrow x(x^2 - 1) \neq 0 \rightarrow x \neq 0, \pm 1$

$\frac{x^2 - 4x}{x^3 - x} \geq 0 \Rightarrow x \in (-\infty, 0) \cup (0, 1) \cup (4, +\infty)$

ب) $y = \sqrt{\frac{x^5 - x^3}{x^3 - x}}$

$\frac{x^5 - x^3}{x^3 - x} \geq 0$

$x^3 - x \neq 0 \rightarrow x(x^2 - 1) \neq 0 \rightarrow x \neq 0, \pm 1$

$\frac{x^5 - x^3}{x^3 - x} \geq 0 \Rightarrow x \in (-\infty, -1) \cup (1, +\infty)$

$D = \mathbb{R} - \{-1, 0, 1\}$

الف) $y = \sqrt{x+1}$

$x+1 \geq 0$

$x \geq -1$

$D = [0, +\infty)$

ب) $y = \sqrt{x|x|}$

$x|x| \geq 0$

if $x \geq 0 \rightarrow \checkmark$

if $x = 0 \rightarrow \checkmark$

if $x < 0 \rightarrow \checkmark$

$D = \mathbb{R}^+$

الف) $y = \sqrt{2 - [x]}$

$2 - [x] \geq 0$

$[x] \leq 2 \rightarrow x < 3$

$D = (-\infty, 3)$

ب) $y = \frac{1}{\sqrt{2 - [x]}}$

$2 - [x] > 0$

$[x] < 2$

$D = (-\infty, 2)$

الف) $y = \sqrt{[x - \frac{1}{p}] + [x + \frac{1}{p}]} =$

$[x - \frac{1}{p}] + [x + \frac{1}{p}] \geq 0$

$[x - \frac{1}{p}] + [-(x - \frac{1}{p})] \geq 0$

if $a \in \mathbb{Z} \rightarrow [a] + [-a] = 0$

if $a \notin \mathbb{Z} \rightarrow [a] + [-a] = -1$

$\Rightarrow D = \{x | x = k + \frac{1}{p}, k \in \mathbb{Z}\}$

$D = [\frac{1}{p}, +\infty)$

الف) $y = \frac{2}{\sin x - 1}$

$\sin x - 1 \neq 0$

$\sin x \neq 1$

$D = \mathbb{R} - \{\frac{\pi}{2} + 2k\pi\}$

ب) $y = \frac{3}{2 \sin^2 x - 1}$

$2 \sin^2 x - 1 \neq 0$

$\sin^2 x \neq \frac{1}{2}$

$D = \mathbb{R} - \{\frac{\pi}{4} + \frac{k\pi}{2}\}$