

$$\text{الف) } y = \sqrt{x \sin x - 1} \Rightarrow x \sin x - 1 \geq 0 \Rightarrow x \sin x \geq 1 \Rightarrow \sin x \geq \frac{1}{x}$$

$$D_f = \left[x_{k+1} + \frac{\pi}{4}, x_{k+1} + \frac{5\pi}{4} \right]$$

(P) ✓

$$\text{ب) } y = \sqrt{\cos x - 1} \Rightarrow \cos x - 1 \geq 0 \Rightarrow \cos x \geq 1 = D_f = \{x_{k\pi}\}$$

$$\text{الف) } \cos y = |x| - 1 \Rightarrow -1 \leq |x| - 1 \leq 1 \Rightarrow 0 \leq |x| \leq 2 \Rightarrow x \in [-2, 2]$$

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

(P) ✓

$$\text{ب) } y = \arcsin(x^2 - x + 1) \Rightarrow -1 \leq x^2 - x + 1 \leq 1 \Rightarrow \begin{cases} x^2 - x + 1 \geq -1 \Rightarrow (x-1)(x+2) \geq 0 \\ x^2 - x + 1 \leq 1 \Rightarrow x(x-1) \leq 0 \end{cases}$$

$$\text{①: } \frac{-1}{1+1-1+1} \quad , \text{ ②: } \frac{-1}{1+1-1+1} \Rightarrow [-2, -1] \cup [0, 1]$$

$$\text{الف) } y = \sqrt{x - \log_p(x-1)} \Rightarrow x - \log_p(x-1) \geq 0 \Rightarrow \log_p(x-1) \leq x$$

$$x-1 \leq 1 \Rightarrow x \leq 2$$

(P) ✓

$$\text{ب) } y = \log(x^2 - x) \Rightarrow x^2 - x > 0 \Rightarrow x(x-1) > 0 \Rightarrow x < 0 \text{ or } x > 1$$

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

$$\text{الف) } y = \frac{x}{x^2 - 1} \Rightarrow x^2 - 1 \neq 0 \Rightarrow x^2 \neq 1 \Rightarrow D_f = \mathbb{R} - \{1, -1\}$$

$$\text{ب) } y = \frac{x}{x^2 - 1} \Rightarrow x^2 - 1 \neq 0 \Rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1 \Rightarrow D_f = \mathbb{R} - \{1, -1\}$$

(P) ✓

$$\text{ج) } y = \frac{x}{x^2 - x} \Rightarrow x^2 - x \neq 0 \Rightarrow x^2 \neq x \Rightarrow x \neq \log_x x \Rightarrow D_f = \mathbb{R} - \{\log_x x\}$$

$$\text{د) } y = \frac{x}{x^2 - x} \Rightarrow x^2 - x \neq 0 \Rightarrow x^2 \neq x \Rightarrow x \neq \log_x x \Rightarrow D_f = \mathbb{R} - \{\log_x x\}$$

$$\text{الف) } y = (x+1)! \Rightarrow x+1 \in \mathbb{N} \Rightarrow x \in \mathbb{N} - 1 \Rightarrow x \in \{0, 1, 2, \dots\}$$

$$D_f = \{x \mid x \in \mathbb{N} - 1, x \in \mathbb{N}\}$$

(P) ✓

$$\text{ب) } y = \left(\frac{x-1}{x-a} \right)! \Rightarrow \frac{x-1}{x-a} \in \mathbb{N} \Rightarrow x-1 \in \mathbb{N}(x-a) \Rightarrow x-1 \in \mathbb{N} - a$$

$$x = \frac{-a+1}{1-a}$$

$$D_f = \{x \mid x \in \frac{-a+1}{1-a}, x \in \mathbb{N}\}$$

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الف) $y = \sqrt{\frac{x^2 - 4x}{x^3 - x}} = \frac{x(x-4)}{x^3 - x} > 0 \Rightarrow x^3 - x \neq 0 \Rightarrow x(x-1)(x+1)$
 $D_f = [4, +\infty) \cup (0, 1) \cup (-1, 0) \Leftarrow \frac{-1}{-1} + \frac{0}{0} + \frac{1}{1} + \frac{1}{1}$
 ب) $y = \sqrt{\frac{x^3 - x^2}{x^3 - x}} \Rightarrow \frac{x^2 - x}{x^3 - x} > 0 \Rightarrow x^3 - x \neq 0 \Rightarrow x(x-1)(x+1)$
 $x^3 - x^2 \Rightarrow x^2(x-1)(x+1) \Rightarrow \frac{-1}{-1} + \frac{0}{0} + \frac{1}{1} + \frac{1}{1}$

الف) $y = \frac{x+1}{\sqrt{x+|x|}} = x + |x| > 0 \Rightarrow x > -|x| \Rightarrow D_f = (0, +\infty)$

ب) $y = \frac{1}{\sqrt{x|x|}} \Rightarrow x|x| > 0 \Rightarrow D_f = (0, +\infty)$

الف) $y = \sqrt{x - [x]} \Rightarrow x - [x] > 0 \Rightarrow x > [x] \Rightarrow D_f = (-\infty, x)$

ب) $y = \frac{1}{\sqrt{x - [x]}} \Rightarrow x - [x] > 0 \Rightarrow x > [x] \Rightarrow D_f = (-\infty, x)$

الف) $y = \sqrt{[x - \frac{1}{x}] + [x + \frac{1}{x}]} \Rightarrow [x - \frac{1}{x}] + [x + \frac{1}{x}] > 0$
 $[x - \frac{1}{x}] + [x + \frac{1}{x} + 1 - 1] > 0 \Rightarrow [x - \frac{1}{x}] + [x + \frac{1}{x}] + 1 > 0$
 $x - \frac{1}{x} > 0 \Rightarrow x > \frac{1}{x} \Rightarrow D_f = (\frac{1}{x}, +\infty)$

ب) $y = \sqrt{[x - \frac{1}{x}] + [-x + \frac{1}{x}]} \Rightarrow [x - \frac{1}{x}] + [-x + \frac{1}{x}] > 0 \Rightarrow D_f = \{x \mid x = k + \frac{1}{x}, k \in \mathbb{Z}\}$

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

ب) $y = \frac{x}{\sin^2 x - 1} \Rightarrow \sin^2 x - 1 \neq 0 \Rightarrow \sin^2 x \neq 1$
 $\sin^2 x \neq 1 \Rightarrow \sin x \neq \pm 1$
 $D_f = \{x \mid x \neq k\pi + \frac{\pi}{2}, k \in \mathbb{Z}\}$