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

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

الف) $y = \frac{x+1}{\sqrt{x+|x|}} \rightarrow x+|x| > 0 \rightarrow \begin{cases} \text{اعداد مثبت} \\ \text{صفر} \\ \text{اعداد منفی} \end{cases} \rightarrow D_f = (0, +\infty)$

ب) $y = \frac{1}{\sqrt{x|x|}} \rightarrow x|x| > 0 \rightarrow \begin{cases} \text{اعداد مثبت} \\ \text{صفر} \\ \text{اعداد منفی} \end{cases} \rightarrow D_f = (0, +\infty)$

الف) $y = \sqrt{1-[x]} \rightarrow 1-[x] \geq 0 \rightarrow [x] \leq 1 \rightarrow D_f = (-\infty, 1)$

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

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

ب) $y = \sqrt{[x - \frac{1}{p}] + [-x + \frac{1}{p}]} \stackrel{!}{=} \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases} \rightarrow x - \frac{1}{p} \in \mathbb{Z}$
 $\rightarrow \sqrt{[x - \frac{1}{p}] + [-x + \frac{1}{p}]} \rightarrow D_f = \{x | x = k + \frac{1}{p}, k \in \mathbb{Z}\}$

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

$y = \frac{p}{p \sin^p x - 1} \rightarrow p \sin^p x - 1 \neq 0 \rightarrow p \sin^p x \neq 1 \rightarrow \sin^p x \neq \frac{1}{p} \rightarrow \sin x \neq \frac{1}{\sqrt[p]{p}} \times \frac{\sqrt[p]{p}}{\sqrt[p]{p}} \stackrel{!}{=} \frac{1}{\sqrt[p]{p}}$
 $\rightarrow \bigcirc \rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2} - 2k\pi + \frac{\pi}{p}, 2k\pi + \frac{\pi}{2} + 2k\pi + \frac{\pi}{p}\}$
 $2k\pi \pm \frac{\pi}{2}$

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

$D_f = \left[p k \pi + \frac{\pi}{9}, p k \pi + \frac{8\pi}{9} \right]$

ب) $y = \sqrt{\cos x - 1} \rightarrow \cos x - 1 \geq 0 \rightarrow \cos x \geq 1 \rightarrow$



✓ (B)

الف) $\cos y = |x| - p \rightarrow -1 \leq |x| - p \leq 1 \rightarrow -1 \leq |x| - p \rightarrow p \leq |x| \rightarrow p \leq x, x \leq -p$

$|x| - p \leq 1 \rightarrow |x| \leq p+1 \rightarrow -p-1 \leq x \leq p+1$

$\rightarrow D_f = [-p-1, p+1] \cup [p, \infty)$

ب) $y = \arcsin(x^p + p x + 1) \rightarrow -1 \leq x^p + p x + 1 \leq 1$

$\rightarrow D_f = [-p, -1] \cup [-1, 0]$

(B) ✓

$-1 \leq x^p + p x + 1 \rightarrow 0 \leq x^p + p x + 2$

$\rightarrow 0 \leq (x+1)(x^p + 1)$

$\rightarrow \frac{-1}{+p} - \frac{-1}{-p} \rightarrow (-\infty, -1] \cup [1, +\infty)$

$x^p + p x \leq 0 \rightarrow x(x^{p-1} + p) \leq 0 \rightarrow \frac{-p}{+p} - \frac{0}{-p} \rightarrow [-p, 0]$

الف) $y = \sqrt{p - \log_p(x-p)} \rightarrow p - \log_p(x-p) \geq 0 \rightarrow p \geq \log_p(x-p) \rightarrow \log_p(x-p) \leq p \rightarrow x-p \leq p \rightarrow x \leq p+1$

$x-p > 0 \rightarrow x > p \rightarrow D_f = (p, p+1]$

ب) $y = \log(x^p - x) \rightarrow x^p - x > 0 \rightarrow x(x^{p-1} - 1) > 0 \rightarrow x(x-1)(x^{p-2} + \dots + 1) > 0$

$\rightarrow \frac{-1}{-p} + \frac{0}{+p} - \frac{1}{+p} \rightarrow D_f = (-1, 0) \cup (1, +\infty)$

(B) ✓

الف) $y = \frac{p}{p x + 1} \rightarrow p x + 1 \neq 0 \rightarrow p x \neq -1 \rightarrow$

ب) $y = \frac{p}{p x - 1} \rightarrow p x - 1 \neq 0 \rightarrow p x \neq 1 \rightarrow \log p = x \rightarrow x = 0 \rightarrow D_f = \mathbb{R} - \{0\}$

ج) $y = \frac{p}{p x - p} \rightarrow p x - p \neq 0 \rightarrow p x \neq p \rightarrow \log p = x \rightarrow x = 1 \rightarrow D_f = \mathbb{R} - \{1\}$

د) $y = \frac{p}{p x - p} \rightarrow p x - p \neq 0 \rightarrow p x \neq p \rightarrow \log p = x \rightarrow D_f = \mathbb{R} - \{1\}$

✓ (B)

الف) $y = (k x + 1)! \rightarrow k x + 1 \in \mathbb{N} \rightarrow k x \in \mathbb{N} - 1 \rightarrow x \in \frac{\mathbb{N} - 1}{k} \rightarrow D_f = \{x | x = \frac{k-1}{k}, k \in \mathbb{N}\}$

ب) $y = \left(\frac{p x - p}{p x - \omega} \right)! \rightarrow \frac{p x - p}{p x - \omega} \in \mathbb{N} \rightarrow p x - p \in p(\omega x - \omega) \rightarrow \omega \omega - p \in p(\omega x - p x)$

$\rightarrow \omega \omega - p \in x(p \omega - p) \rightarrow x \in \frac{\omega \omega - p}{p \omega - p} \rightarrow D_f = \{x | x = \frac{\omega k - p}{p k - p}, k \in \mathbb{N}\}$

(B) ✓