

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

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

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

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

$y = \frac{p}{p \sin^p x - 1} \rightarrow p \sin^p x - 1 \neq 0 \rightarrow p \sin^p x \neq 1 \rightarrow \sin^p x \neq \frac{1}{p} \rightarrow \sin x \neq \frac{1}{\sqrt[p]{p}} \rightarrow \sin x \neq \frac{1}{\sqrt[p]{p}} \times \frac{\sqrt[p]{p}}{\sqrt[p]{p}} = \frac{\sqrt[p]{p}}{p}$
 $\rightarrow \bigcirc \rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4}\}$

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

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



$$\text{ب) } y = \sqrt{\cos x - 1} \rightarrow \cos x - 1 \geq 0 \rightarrow \cos x \geq 1 \rightarrow \text{Unit circle diagram showing } x = 0 \rightarrow D_f = \{k\pi\}$$

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$$\text{الف) } \cos y = |x| - 1 \rightarrow -1 \leq |x| - 1 \leq 1 \rightarrow -1 \leq |x| - 1 \rightarrow 0 \leq |x| \rightarrow x \leq 1, x \geq -1$$

$$|x| - 1 \leq 1 \rightarrow |x| \leq 2 \rightarrow -2 \leq x \leq 2$$

$$\rightarrow D_f = [-2, -1] \cup [1, 2]$$

$$\text{ب) } y = \arcsin(x^2 + 1) \rightarrow -1 \leq x^2 + 1 \leq 1 \rightarrow$$

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

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

$$\rightarrow 0 \leq (x+1)(x-1) \rightarrow$$

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

$$\rightarrow x^2 + 1 \leq 0 \rightarrow x^2 \leq -1 \rightarrow \text{No solution}$$

$$\rightarrow [-1, 0]$$

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$$\text{الف) } y = \sqrt{1 - \log_{\mu}(x-1)} \rightarrow 1 - \log_{\mu}(x-1) \geq 0 \rightarrow 1 \geq \log_{\mu}(x-1) \rightarrow \log_{\mu}(x-1) \leq 1 \rightarrow x-1 \leq \mu \rightarrow x \leq \mu+1$$

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

$$\text{ب) } y = \log(x^{\mu} - x) \rightarrow x^{\mu} - x > 0 \rightarrow x(x^{\mu-1} - 1) > 0 \rightarrow x(x-1)(x+1) > 0$$

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

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$$\text{الف) } y = \frac{\mu}{kx+1} \rightarrow kx+1 \neq 0 \rightarrow kx \neq -1 \rightarrow \text{وجود ندارد} \rightarrow D_f = \mathbb{R}$$

$$\text{ب) } y = \frac{\mu}{kx-1} \rightarrow kx-1 \neq 0 \rightarrow kx \neq 1 \rightarrow \log k = x \rightarrow x = 0 \rightarrow D_f = \mathbb{R} - \{0\}$$

$$\text{ج) } y = \frac{\mu}{kx-\mu} \rightarrow kx-\mu \neq 0 \rightarrow kx \neq \mu \rightarrow \log k = x \rightarrow x = \mu \rightarrow D_f = \mathbb{R} - \{\mu\}$$

$$\text{د) } y = \frac{\mu}{kx-\mu} \rightarrow kx-\mu \neq 0 \rightarrow kx \neq \mu \rightarrow \log k = x \rightarrow D_f = \mathbb{R} - \{\log k\}$$

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

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

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

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