

الف)  $\frac{x^2-4x}{x^3-x} \geq 0 \rightarrow \frac{x(x-4)}{x(x-1)(x+1)} \geq 0$

$x^3-x \neq 0 \rightarrow x^2 \neq x \Rightarrow x \neq 1, 0, -1$

$\rightarrow \frac{x^2-x^3}{x^3-x} > 0 \Rightarrow \frac{x(x-1)(x+1)}{x(x-1)(x+1)} > 0$

19, 8

$D_f = (-1, 0) \cup (0, 1) \cup [4, +\infty)$

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

✓

الف)  $x+|x| > 0$

$D_f = (0, +\infty)$

$\rightarrow x|x| > 0$

$D_f = (0, +\infty)$

✓

الف)  $2-[x] \geq 0 \rightarrow [x] \leq 2 \rightarrow D_f = (-\infty, 3)$

$\rightarrow 2-[x] > 0$

$[x] < 2 \Rightarrow D_f = (-\infty, 2)$

✓

الف)  $[x - \frac{1}{x}] + [x + \frac{x}{x}] \rightarrow 2[x - \frac{1}{x}] + 1 \geq 0$

$[x - \frac{1}{x}] \geq -\frac{1}{x} \rightarrow [x - \frac{1}{x}] \geq 0 \Rightarrow x \geq \frac{1}{x}$

$D_f = [\frac{1}{x}, +\infty)$

ب)  $\sqrt{[x - \frac{1}{x}] + [-(x - \frac{1}{x})]}$

$\begin{cases} n \in \mathbb{Z} & [n] + [-n] = 0 \\ n \notin \mathbb{Z} & [n] + [-n] = -1 \end{cases} \Rightarrow x - \frac{1}{x} \in \mathbb{Z}$

$D_f = \{x \mid x = k + \frac{1}{x}, 1 \leq k \leq 2\}$

✓

الف)  $\sin x - 1 \neq 0$

$\sin x \neq 1$



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

✓

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

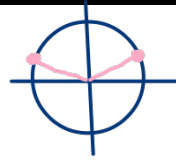
$\sin x \neq \pm \frac{\sqrt{2}}{2}$



$D_f = \mathbb{R} - \{k\pi + \frac{\pi}{4}, k\pi + \frac{3\pi}{4}\}$

$\frac{1}{x} + \frac{x}{x} \Rightarrow \sqrt{\frac{1}{x} + \frac{x}{x}} \Rightarrow \sqrt{\frac{1}{x} + \frac{x}{x}} = \frac{\sqrt{2}}{x}$

الف)  $x \sin x - 1 \geq 0$   
 $x \sin x \geq 1 \Rightarrow \sin x \geq \frac{1}{x}$



$D_f = [x \in \mathbb{R} \mid x \in [\frac{\pi}{2}, \frac{3\pi}{2}]]$

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



$D_f = \{x \in \mathbb{R} \mid x = 2k\pi\}$  (✓) ✓

الف)  $-1 \leq |x| - 3 \leq 1$   
 $2 \leq |x| \leq 4$

$D_f = [-4, -2] \cup [2, 4]$

ب)  $-1 \leq x^2 + 3x + 1 \leq 1$   
 $x^2 + 3x + 1 \leq 1 \Rightarrow x(x+3) \leq 0 \Rightarrow -3 \leq x \leq 0$   
 $x^2 + 3x + 1 \geq 0 \Rightarrow (x+1)(x+2) \geq 0 \Rightarrow x \leq -2, x \geq -1$   
 $D_f = [-3, -2] \cup [-1, 0]$

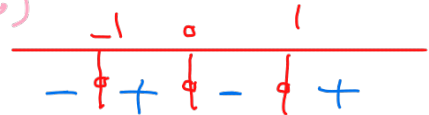
الف)  $x - 2 > 0 \Rightarrow x > 2$

$\log_2(x-2) \leq 2 \Rightarrow x-2 \leq 4 \Rightarrow x \leq 6$

$D_f = (2, 6]$

ب)  $x^3 - x > 0$   
 $x(x-1)(x+1) > 0$   
 $x \neq 0, 1, -1$

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



الف)  $\epsilon^{n+1} \neq 0 \Rightarrow \epsilon^n \neq -1$

$D_f = \mathbb{R}$

ب)  $\epsilon^n - 1 \neq 0 \Rightarrow \epsilon^n \neq 1$

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

(✓) ✓

ج)  $\epsilon^n - 2 \neq 0 \Rightarrow \epsilon^n \neq 2 \Rightarrow n = \log_{\epsilon} 2 = \frac{1}{\epsilon}$

$D_f = \mathbb{R} - \{\frac{1}{\epsilon}\}$

د)  $\epsilon^n - 3 \neq 0 \Rightarrow \epsilon^n \neq 3 \Rightarrow n = \log_{\epsilon} 3$

$D_f = \mathbb{R} - \{\log_{\epsilon} 3\}$

الف)  $\epsilon x + 1 \in W$

$\epsilon x \in W - 1 \Rightarrow D_f = \{x \mid x = \frac{k-1}{\epsilon}, k \in W\}$

$x \in \frac{W-1}{\epsilon}$

(✓) ✓

ب)  $\frac{\epsilon x - 1}{\epsilon x - \omega} \in W \Rightarrow \epsilon x - 1 = \omega(\epsilon x - \omega)$

$\epsilon x - 1 = \epsilon \omega x - \omega^2 \Rightarrow \epsilon x - \epsilon \omega x = 1 - \omega^2 \Rightarrow x(\epsilon - \epsilon \omega) = 1 - \omega^2 \Rightarrow x = \frac{1 - \omega^2}{\epsilon(1 - \omega)}$

$D_f = \{x \mid x = \frac{1 - \omega^2}{\epsilon(1 - \omega)}, k \in W\}$

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