

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

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

الف) $|x| > -x \Rightarrow D_f = (0, +\infty)$
 $|x| > -x \Rightarrow x > -|x| \xrightarrow{x \geq 0} 2x > 0 \Rightarrow x > 0$
 $\xrightarrow{x < 0} -x > 0 \Rightarrow x < 0$

ب) $|x| > 0 \Rightarrow D_f = (0, +\infty)$
 $|x| > 0 \Rightarrow x > 0 \vee x < 0$

الف) $\psi = [x] \geq 0 \Rightarrow [x] \leq \psi \Rightarrow x < \psi \Rightarrow D_f = (-\infty, \psi)$

ب) $\psi - [x] > 0 \Rightarrow [x] < \psi \Rightarrow D_f = (-\infty, \psi) \quad x < \psi$

الف) $[x + \frac{1}{\psi}] + [x - \frac{1}{\psi}] = [x - \frac{1}{\psi}] + [x - \frac{1}{\psi}] + 1 = 2[x - \frac{1}{\psi}] + 1 \geq 0$
 $[x - \frac{1}{\psi}] \geq -\frac{1}{2}$
 $x - \frac{1}{\psi} \geq -\frac{1}{2} \Rightarrow x \geq \frac{1}{\psi} - \frac{1}{2}$
 $D_f = [\frac{1}{\psi} - \frac{1}{2}, +\infty)$

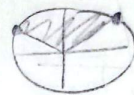
ب) $[x - \frac{1}{\psi}] + [x + \frac{1}{\psi}] \geq 0 \Rightarrow \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases}$
 $[x - \frac{1}{\psi}] + [-(x - \frac{1}{\psi})] \geq 0 \Rightarrow \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases}$
 $D_f = \{x \mid x = k + \frac{1}{\psi}, k \in \mathbb{Z}\} \quad x - \frac{1}{\psi} \in \mathbb{Z}$

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

ب) $\psi \sin^2 x \neq 1 \quad x \neq 2k\pi + \frac{\pi}{2}$
 $\sin^2 x \neq \frac{1}{\psi} \quad D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2} \mid k \in \mathbb{Z}\}$
 $\sin x \neq \pm \frac{1}{\sqrt{\psi}}$

الف) $2|\sin x| \geq 0$
 $\sin x \geq \frac{1}{2}$

$D_f = \left[\frac{\pi}{6} + 2k\pi, \frac{5\pi}{6} + 2k\pi \right]$



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

$D_f = 2k\pi$



الف) $\cos y = |x| - 3$

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

$2 \leq |x| \leq 4$

$2 \leq x \leq 4$

$-4 \leq x \leq -2$

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

ب) $|x^2 + 3x + 1| \leq 1$

$0 \leq x^2 + 3x + 1 \leq 2$

$(x+1)(x+4) \geq 0$

$x \geq -1$

$x \leq -4$

$D_f = [-1, 0] \cup [-4, -3]$

$x(x+3) \leq 0$

$0 \leq x \leq -3$

الف) $2 - \log_3(x-2) \geq 0$

$\log_3(x-2) \leq 2$

$x-2 \leq 9$

$x \leq 11$

$x-2 > 0$

$x > 2$

$D_f = (2, 11]$

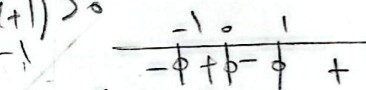
ب) $x^3 - x > 0$

$x(x^2 - 1) > 0$

$x(x-1)(x+1) > 0$

$x > 1$

$x < -1$



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

الف) $\epsilon^x + 1 > 0$

$D_f = \mathbb{R}$

هو موجب

ب) $\epsilon^x - 1 \neq 0$

$\epsilon^x \neq 1$

$x \neq 0$

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

ج) $\epsilon^x \neq 1$

$\log_3 \epsilon^x \neq x$

$D_f = \mathbb{R} - \{\log_3 \epsilon\}$

د) $\epsilon^x - 2 \neq 0$

$\epsilon^x \neq 2$

$D_f = \mathbb{R} - \{\frac{1}{\log_3 2}\}$

$\epsilon^x \neq 2 \rightarrow x \neq \frac{1}{\log_3 2}$

الف) $\epsilon x + 1 \in \mathbb{W}$ $D_f = \{x | x = \frac{k-1}{\epsilon}, k \in \mathbb{W}\}$

ب) $\frac{3x-2}{2x-5} \in \mathbb{W}$ $D_f = \{x | x = \frac{2-5k}{3-2k}, k \in \mathbb{Z}\}$

$3x-2 = 2wx-5w$

$3x-2wx = 2-5w \rightarrow x = \frac{2-5w}{3-2w}$