

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

(الف) $x + |x| > 0$ $D_f = (0, +\infty)$
 $|x| > -x$
 $x > -|x| \rightarrow x > 0$

$\rightarrow) x|x| > 0$
 $\lim_{x \rightarrow 0^+} x^2 > 0 \quad \checkmark \quad D_f = (0, +\infty)$
 $\lim_{x \rightarrow 0^-} -x < 0 \quad \checkmark$

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

$$D_f = (-\infty, 4) \quad x < 4$$

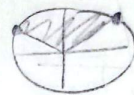
الف) $\lceil n + \frac{1}{4} \rceil + \lceil n - \frac{1}{4} \rceil = \lceil n - \frac{1}{4} \rceil + \lceil n - \frac{1}{4} \rceil + 1 = 2 \lceil n - \frac{1}{4} \rceil + 1 \geq 0$
 $\rightarrow \lceil n - \frac{1}{4} \rceil + \lceil n + \frac{1}{4} \rceil \geq 0$
 $\lceil n - \frac{1}{4} \rceil + \lceil -(n - \frac{1}{4}) \rceil \geq 0 \rightarrow \begin{cases} a \in \mathbb{Z} & \lceil a \rceil + \lceil -a \rceil = 0 \\ a \notin \mathbb{Z} & \lceil a \rceil + \lceil -a \rceil = -1 \end{cases}$
 $D_f = \{n \mid n = k + \frac{1}{4}, k \in \mathbb{Z}\} \quad n - \frac{1}{4} \in \mathbb{Z}$

الف) $y = \frac{r}{\sin \pi - 1}$ $\sin \pi \neq 1$ $\pi \neq r k M + \frac{\pi}{r}$ $D_f = R - \left\{ \frac{\pi}{r} + r k M \mid k \in \mathbb{Z} \right\}$

$$\rightarrow \begin{aligned} & \sin^2 n \neq 1 \\ & \sin^2 n \neq \frac{1}{4} \\ & \sin n \neq \pm \frac{\sqrt{3}}{2} \end{aligned} \quad \begin{aligned} & n \neq k\pi + \frac{\pi}{2} \\ & D_f = \mathbb{R} - \left\{ \cancel{k\pi + \frac{\pi}{2}} \mid k \in \mathbb{Z} \right\} \end{aligned}$$

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) $\cos y = |x| - 3$

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

$2 \leq |x| \leq 4$

$2 \leq x \leq 4$

$-4 \leq x \leq -2$

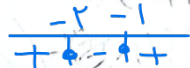
$D_f = [2, 4] \cup [-4, -2]$

1, v b

ب) $1 \leq x^2 + 3x + 1 \leq 1$

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

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

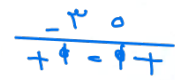


$x \geq -1$
 $x \leq -4$

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

$x^2 + 3x \leq 0$

$x(x+3) \leq 0$



الف) $2 - \log_3(x-2) \geq 0$

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

$x-2 \leq 9$

$x \leq 11$

$x-2 > 0$

$x > 2$

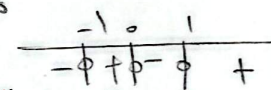
$D_f = (2, 11]$

1, v b

ب) $x^3 - x > 0$

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

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



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

الف) $x^2 + 1 > 0$

$D_f = \mathbb{R}$

هو احيى

ب) $x^2 - 1 \neq 0$

$x \neq 1$

$x \neq -1$

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

ج) $x^2 \neq 0$

$\log_3 x \neq x$

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

د) $x^2 - 2 \neq 0$

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

$x \neq \sqrt{2}$

$x^2 \neq 2 \rightarrow x \neq \sqrt{2}$

Ⓟ ✓

الف) $\varepsilon x + 1 \in \omega$ $D_f = \{x | x = \frac{k-1}{\varepsilon}, k \in \omega\}$

Ⓟ ✓

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

$3x-2 = 2\omega x - 5\omega$

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