

الف) $\frac{x(x-4)}{x(x^2-1)} \geq 0$

$$\frac{-1 \quad 0 \quad 1 \quad 4}{- \quad + \quad + \quad - \quad +}$$

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

ب) $\frac{x^3(x^2-1)}{x(x^2-1)} \geq 0$

$$\frac{+ \quad - \quad + \quad - \quad +}{+ \quad + \quad + \quad +}$$

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

الف) $x + |x| > 0$
 $|x| > -x$

$D = \mathbb{R}^+$

ب) $x|x| > 0$

$D = \mathbb{R}^+$

الف) $2 - [x] \geq 0$
 $2 \geq [x]$

$D = (-\infty, 2)$

ب) $2 - [x] > 0$
 $2 > [x]$

$D = (-\infty, 2)$

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

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

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

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

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

$[x - \frac{1}{2}] \geq -[x - \frac{1}{2}]$

$x - \frac{1}{2} \geq 0 \rightarrow x - \frac{1}{2} \in \mathbb{Z} \rightarrow x \in \mathbb{Z} + \frac{1}{2}$
 $D = \{x \mid x = k + \frac{1}{2}, k \in \mathbb{Z}\}$

الف) $\sinh x - 1 \neq 0$
 $\sinh x \neq 1$

$D = \mathbb{R} - \left\{2k\pi + \frac{\pi}{2}\right\}$

$x - \frac{1}{2} \geq 0$
 $x \geq \frac{1}{2}$

ب) $\sinh x - 1 \neq 0$
 $\sinh x \neq \pm \sqrt{\frac{e^x - e^{-x}}{2}}$

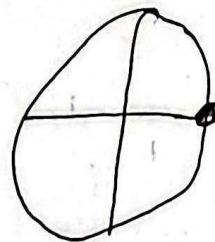
$D = \mathbb{R} - \left\{k\pi \pm \frac{\pi}{2}\right\}$

ا) $2 \sin x - 1 \geq 0$
 $\sin x \geq \frac{1}{2}$



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

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



$D = [2k\pi]$

ا) $\cos x = |x| - 2$

$D = [-2, -1] \cup [1, 2]$

ب) $-1 \leq x^2 + \frac{1}{x^2} + 1 \leq 1$

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

$2 \leq |x| \leq 3$

$\begin{cases} 2 \leq |x| \\ |x| \leq 3 \end{cases} \rightarrow \begin{cases} x \geq 2 \\ x \leq -2 \end{cases}$ $\textcircled{P} \checkmark$

$x^2 + \frac{1}{x^2} + 1 \geq 0$

$(x+1)(x+2) \geq 0$; $x(x+2) \leq 0$

$\begin{array}{c} + \quad - \quad - \quad + \\ - \quad 1 \quad - \quad 2 \end{array}$ $\begin{array}{c} + \quad - \quad - \quad + \\ - \quad 0 \quad - \quad 2 \end{array}$

$D = [-1, 0] \cup [-2, -1]$

ا) $2 - \log_2(x-2) \geq 0$

$\log_2 = 2 \geq \log_2(x-2)$

$x-2 \leq 4$

$x \leq 6$ $\textcircled{P} \checkmark$

$D = (2, 6]$

ب) $x^2 - x > 0$

$x(x-1) > 0$

$\begin{array}{c} - \quad 0 \quad + \\ - \quad 0 \quad + \end{array}$

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

ا) $x^x + 1 \neq 0$

$x^x \neq -1$

$D = \mathbb{R}$

$\textcircled{P} \checkmark$

ب) $x^x - 1 \neq 0$

$x^x \neq 1$

$x \neq 0$

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

ج) $x^x - 2 \neq 0$

$x^x \neq 2$

$x \neq \log_2 x$

$D = \mathbb{R} - \left\{ \frac{1}{2} \right\}$

د) $x^x - 3 \neq 0$

$x^x \neq 3$

$x \neq \log_3 x$

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

ا) $x+1 \in W$

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

$D = \left\{ x \mid x = \frac{x+1}{x}, x \in W \right\}$ $\textcircled{P} \checkmark$

ب) $\frac{x^2 - 1}{x - 1} \in W$

$x^2 - 1 = (x-1)(x+1)$

$x(x-1) = x - 1$

$x = \frac{x-1}{x-1}$ $D = \left\{ x \mid x = \frac{x-1}{x-1}, x \in W \right\}$