

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

ب) $\frac{x^5 - x^3}{x^3 - x} \geq 0$ $\frac{x^3(x^2-1)}{x(x^2-1)} \geq 0$ $\frac{-1}{+} \frac{0}{+} \frac{1}{+}$ $D_f = \mathbb{R} - \{-1, 0, 1\}$

الف) $\frac{x+1}{\sqrt{x+|x|}}$ $x+|x| > 0$ $\begin{matrix} (+) \checkmark \\ (-) \times \\ (0) \times \end{matrix}$ $D_f = (0, +\infty)$

ب) $\frac{1}{\sqrt{x|x|}}$ $x|x| > 0$ $\begin{matrix} (+) \checkmark \\ (-) \times \\ (0) \times \end{matrix}$ $D_f = (0, +\infty)$

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

ب) $2 - [x] > 0$ $[x] < 2 \rightarrow x < 2$ $D_f = (-\infty, 2)$

الف) $[x - \frac{1}{3}] + [x + \frac{2}{3}] \geq 0$ $1 + [x - \frac{1}{3}] + [x + \frac{2}{3}] \geq 1$ $D_f = [\frac{1}{3}, +\infty)$

ب) $[x - \frac{1}{3}] + [-(x - \frac{1}{3})] \geq 0$ $[x + \frac{2}{3}] \geq \frac{1}{3}$ $\frac{1}{3} \leq x + \frac{2}{3} \rightarrow x \geq \frac{1}{3}$

ب) $[x] + [x] \begin{cases} x \in \mathbb{Z} [x] + [-x] = 0 \rightarrow x - \frac{1}{3} \in \mathbb{Z} \quad x \in \mathbb{Z} + \frac{1}{3} \\ x \notin \mathbb{Z} [x] + [-x] = -1 \end{cases}$ $D_f = \{x | x = k + \frac{1}{3}, k \in \mathbb{Z}\}$

الف) $\sin x - 1 \neq 0 \rightarrow \sin x \neq 1$ $\sin x \neq 90^\circ \neq \frac{\pi}{2}$ $D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$

ب) $2\sin^2 x - 1 \neq 0$ $2\sin^2 x \neq 1$ $\sin^2 x \neq \frac{1}{2}$ $\sin x \neq \pm \sqrt{\frac{1}{2}} = \pm \frac{\sqrt{2}}{2} \xrightarrow{\times \sqrt{2}}$ $\sin x \neq \pm \frac{\sqrt{2}}{2}$ $D_f = \{k\pi + \frac{\pi}{4}\}$

الف) $\sqrt{2}\sin x - 1 \geq 0 \quad \sqrt{2}\sin x \geq 1 \quad \sin x \geq \frac{1}{\sqrt{2}} \quad \sin x \geq 30^\circ, 150^\circ$ 

$$D_f = \left[2k\pi + \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4} \right]$$

ب) $\cos x - 1 \geq 0 \quad \cos x \geq 1 \quad D_f = \{2k\pi\}$

لکه می‌تواند از یک مداریم پس فقط مساوی می‌ماند

الف) $\cos y = |x| - 3 \rightarrow -1 \leq |x| - 3 \leq 1 \quad 2 \leq |x| \leq 4 \quad \begin{cases} 2 \leq x \leq 4 \\ -2 \geq x \geq -4 \end{cases}$

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

ب) $-1 \leq x^2 + 3x + 1 \leq 1 \rightarrow -2 \leq x(x+3) \leq 0$

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

$-2 \leq x(x+3) \xrightarrow{x=-2} -2(-2+3) = -2$

$\xrightarrow{x=-\frac{3}{2}} -\frac{3}{2}(-\frac{3}{2}+3) = -\frac{9}{4} < -2$

$D_f = [-2, 0] + \{-\frac{3}{2}\}$

الف) $2 - \log_3(x-2) \geq 0 \quad \log_3(x-2) \leq 2 \quad (x-2) \leq 3^2 \quad x \leq 11$

$x-2 > 0 \quad x > 2 \quad D_f = (2, 11]$

ب) $\log(x^3 - x) \quad x^3 - x > 0 \quad x(x^2 - 1) > 0$

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

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

الف) $f^x + 1 \neq 0$ $D_f = \mathbb{R}$

ب) $f^x - 1 \neq 0 \quad f^x \neq 1 \quad x \neq 0 \quad D_f = \mathbb{R} - \{0\}$

ج) $f^x - 2 \neq 0 \quad f^x \neq 2 \quad \log_f 2 \neq x \quad D_f = \mathbb{R} - \{\log_f 2\}$

د) $f^x - 3 \neq 0 \quad f^x \neq 3 \quad x \neq \log_f 3 \quad D_f = \mathbb{R} - \{\log_f 3\}$

الف) $f_{x+1} \in W \quad f_x \in W-1 \quad x \in \frac{W-1}{f}$

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

ب) $\frac{f^x - 1}{f^x - f} \in W \quad x = \frac{-\omega W + 1}{f^x - f} = \frac{+\omega W - 1}{+f^x - f}$

$D_f = \{x \mid x = \frac{\omega k - 1}{f^k - f}, k \in W\}$