

۱۴, ۲۵

الف) $\frac{x^2 - 9x}{x^3 - x} \geq 0 \Rightarrow \frac{x(x-9)}{x(x^2-1)} \geq 0 \Rightarrow \frac{-1}{+} \frac{0}{-} \frac{1}{+} \frac{9}{-} \frac{+}{+}$ $D_f = [9, +\infty) \cup (0, 1) \cup (-\infty, -1)$

✓ (۲)

ب) $\frac{x^6 - x^3}{x^5 - x} \geq 0 \Rightarrow \frac{x^3(x^3-1)}{x(x^4-1)} \geq 0 \Rightarrow \frac{-1}{+} \frac{0}{+} \frac{1}{+} \frac{1}{+}$ $D_f = \mathbb{R} - \{0, \pm 1\}$

الف) $x + |x| > 0 \rightarrow |x| > -x \rightarrow D_f = \mathbb{R}^+$
 if $x > 0 \rightarrow x > 0 \rightarrow x > 0 \checkmark$
 $x < 0 \rightarrow 0 \rightarrow x$ $D_f = (0, +\infty)$

ب) $x|x| > 0 \rightarrow D_f = \mathbb{R}^+ - \{0\}$
 $\mathbb{R}^+$ خودش شامل صفر نیست

۱, ۵

الف) $\lfloor x \rfloor \geq 0 \rightarrow [x] \leq 1 \rightarrow x < 2 \Rightarrow D_f = (-\infty, 2)$

✓ (۲)

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

الف) $\left\lceil x - \frac{1}{p} \right\rceil + \left\lceil x + \frac{p}{p} \right\rceil \geq 0 \rightarrow \left\lceil x + \frac{p}{p} - 1 \right\rceil + \left\lceil x + \frac{p}{p} \right\rceil \geq 0 \rightarrow \left\lceil x + \frac{p}{p} \right\rceil \geq 1 \rightarrow \left\lceil x + \frac{p}{p} \right\rceil \geq \frac{1}{p}$
 $x + \frac{p}{p} \geq 1 \rightarrow x \geq \frac{1}{p} \Rightarrow D_f = \left[\frac{1}{p}, +\infty\right)$

✓ (۲)

ب) $\left\lceil x - \frac{1}{p} \right\rceil + \left\lceil -\left(x - \frac{1}{p}\right) \right\rceil \geq 0 \quad a \in \mathbb{Z} \xrightarrow{\text{if}} [a] + [-a] = 0 \rightarrow x - \frac{1}{p} \in \mathbb{Z}$

$D_f = \left\{ x \mid x = k + \frac{1}{p}, k \in \mathbb{Z} \right\}$

الف) $\sin x - 1 \neq 0 \rightarrow \sin x \neq 1 \quad D_f = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{2} \right\}$

✓ (۲)

ب) $\sqrt[p]{\sin x} - 1 \neq 0 \rightarrow \sqrt[p]{\sin x} \neq \frac{1}{p} \Rightarrow \sin x \neq \pm \frac{1}{p} \rightarrow \sin x \neq \pm \frac{\sqrt{p}}{p}$

$D_f = \mathbb{R} - \left\{ k\pi \pm \frac{\pi}{p} \right\}$

الف) $p \sin x - 1 \geq 0 \rightarrow \sin x \geq \frac{1}{p}$ $Df = \left[pk\pi + \frac{\pi}{6}, pk\pi + \frac{\omega\pi}{6} \right]$

Ⓟ ✓

ب) $\cos x - 1 \geq 0 \rightarrow \cos x \geq 1$ $Df = [pk\pi]$

الف) $-1 \leq |x| - p \leq 1 \rightarrow p \leq |x| \leq p+1$ $\begin{cases} p \leq x \leq p+1 \\ -p \leq x \leq -p-1 \end{cases} \Rightarrow Df = [p, p+1] \cup [-p-1, -p]$

Ⓛ $\frac{0}{+} \frac{-p}{-} \frac{+}{+}$ Ⓜ $\frac{-1}{+} \frac{-p}{-} \frac{+}{+}$ $Df = [-1, 0] \cup [-p-1, -p]$

Ⓟ ✓

ب) $-1 \leq x^p + px + 1 \leq 1 \rightarrow \begin{cases} x^p + px + 1 \leq 1 \rightarrow x^p + px \leq 0 \rightarrow x(x+p) \leq 0 \quad \textcircled{1} \\ -1 \leq x^p + px + 1 \rightarrow 0 \leq x^p + px + p \rightarrow 0 \leq (x+1)(x+p) \quad \textcircled{2} \end{cases}$

الف) $\begin{cases} x-p > 0 \rightarrow x > p \\ p \cdot \log_p(x-p) \geq 0 \rightarrow \log_p(x-p) \geq 1 \Rightarrow x-p \geq p \rightarrow x \geq 2p \end{cases} \Rightarrow Df = (p, \infty)$

1, 1, 1, 1

ب) $x^p - x > 0 \Rightarrow x(x^{p-1} - 1) \Rightarrow \frac{-1}{+} \frac{0}{-} \frac{1}{+}$ $Df = (-1, 0) \cup (1, +\infty)$

الف) $f^{x+1} \neq 0 \rightarrow f^x \neq -1 \Rightarrow Df = \mathbb{R}$

ب) $f^x - 1 \neq 0 \rightarrow f^x \neq 1 \Rightarrow x \neq 0 \rightarrow Df = \mathbb{R} - \{0\}$

Ⓟ ✓

ج) $f^{x-p} \neq 0 \rightarrow f^x \neq p \Rightarrow x \neq \log_p p \Rightarrow Df = \mathbb{R} - \{\log_p p\}$

د) $f^{x-p} \neq 0 \rightarrow f^x \neq p \Rightarrow x \neq \log_p p \Rightarrow Df = \mathbb{R} - \{\log_p p\}$

الف) $f_{n+1} \in \omega \rightarrow n \in \omega - \frac{1}{f} \Rightarrow Df = \{n | n = k - \frac{1}{f}, k \in \omega\}$

ب) $\frac{p_n - p}{p_n - \omega} \in \omega \rightarrow p_n - p = p_n \omega - \omega \omega \rightarrow p_n - p_n \omega = -\omega \omega + p \rightarrow n = \frac{-\omega \omega + p}{-p \omega + p}$

Ⓟ ✓

$Df = \{n | n = \frac{\omega k - p}{p k - p}, k \in \omega\}$