

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

ب) $\frac{x^4 - x^3}{x^2 - x} \geq 0 \rightarrow \frac{x^3(x-1)}{x(x-1)} = x^2 \geq 0$
 $x(x-1) \neq 0$
 $R = \{x \mid x \neq 0, x \neq 1\}$

الف) $x + |x| \geq 0 \rightarrow x \geq -|x| \rightarrow R^+ \rightarrow (0, \infty)$

ب) $x|x| \geq 0 \rightarrow x \in R^+ \rightarrow (0, +\infty)$

الف) $x - [x] \geq 0 \rightarrow x \geq [x] \rightarrow x < [x] + 1 \rightarrow (-\infty, 1)$

ب) $x - [x] \geq 0 \rightarrow x \geq [x] \rightarrow (-\infty, 1)$

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

$[x + \frac{p}{p}] + 1 + [x + \frac{p}{p}] \geq 0 \rightarrow [x + \frac{p}{p}] \geq -1 \rightarrow [x + \frac{p}{p}] \geq -\frac{1}{p} \rightarrow \left[\frac{1}{p}, \infty\right)$

ب) $[x - \frac{1}{p}] + [-x + \frac{1}{p}] \rightarrow \begin{matrix} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{matrix} \Rightarrow x - \frac{1}{p} \in \mathbb{Z}$

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

الف) $\sin^2 x - 1 \neq 0 \rightarrow \sin x \neq \pm 1 \rightarrow R = \left\{ \frac{\pi}{p} + k\pi \mid k \in \mathbb{Z} \right\}$

ب) $\sin^2 x - 1 \neq 0 \rightarrow \sin x = \pm \frac{\sqrt{p}}{p} \rightarrow x = \frac{\pi}{p} + \frac{k\pi}{p}$
 $\sin^2 x \neq \frac{1}{p}$
 $R = \left\{ \frac{\pi}{p} + \frac{k\pi}{p} \mid k \in \mathbb{Z} \right\}$

الف) $\sin x - 1 > 0 \quad \sin x > \frac{1}{p} \quad pk\pi + \frac{\pi}{4} \leq x \leq \frac{5\pi}{4} + pk\pi$
 $D = [\frac{\pi}{4} + pk\pi, \frac{5\pi}{4} + pk\pi]$

ب) $\cos x - 1 > 0 \quad \cos x > 1$
 $\hookrightarrow \cos x = 1 \rightarrow pk\pi$  $D = \{pk\pi\}$

الف) $-1 < |x| - p \leq 1 \quad p < |x| \leq p+1 \quad x \in [-p-1, -p] \cup [p, p+1]$

ب) $-1 < x^p + px + 1 \leq 1$
 $x^p + px \leq 0 \rightarrow x(x + \frac{p}{x}) \leq 0 \rightarrow -\frac{p}{x} \leq x \leq 0$
 $0 \leq x^p + px + 1 \rightarrow (x+1)(x+p) \geq 0 \rightarrow x \leq -1 \text{ or } x \geq -p$
 $D = [-p, -1] \cup [0, \infty)$

الف) $x - p > 0 \quad x > p \quad p - \log(x+p) > 0 \quad \log(x+p) < p \quad x - p \leq 9 \quad x \leq 11$
 $(p, 11]$

ب) $x^3 - x > 0 \quad x(x-1)(x+1) > 0$
 $-1 \quad 0 \quad 1 \quad (-1, 0) \cup (1, \infty)$

الف) $x^x + 1 \neq 0 \quad x^x \neq -1 \quad x \in \mathbb{R}$

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

ج) $x^x - p \neq 0 \quad x^x \neq p \quad x \neq \log_p p \quad \log_p p = \frac{1}{p} \quad \mathbb{R} - \{\frac{1}{p}\}$

د) $x^x - p \neq 0 \quad x^x \neq p \quad x \neq \log_p p \quad \mathbb{R} - \{\log_p p\}$

الف) $x^x + 1 \in W \rightarrow x \in \frac{W}{x} \quad D = \{x | x \in \frac{k-1}{x}, k \in W\}$

ب) $\frac{px - p}{x - w} \in W \quad px - pw = p(x - w) \rightarrow px - pw = p(x - w)$
 $x(p - pw) = p - pw$
 $D = \{x | x \in \frac{p - pw}{p - pw}, k \in W\}$
 $\hookrightarrow x \in \frac{p - pw}{p - pw}$