

الف) $\frac{x^2 - 4}{x^2 - x} \geq 0 \Rightarrow \frac{x(x-4)}{x(x-1)} \geq 0$
 ریشه‌ها: $x = -1, 0, 1, 4$
 جدول علامت: $\begin{array}{c|ccccccc} & (-\infty, -1) & (-1, 0) & (0, 1) & (1, 4) & (4, \infty) \\ \hline \text{علامت} & + & - & + & - & + \end{array}$
 جواب: $x \in (-\infty, -1) \cup (0, 1) \cup (4, \infty)$

۲ ✓

الف) $|x+1| > 0 \Rightarrow x > -1$
 این عبارت برای اعداد مثبت برقرار است.
 $D_f = \mathbb{R}^+ \cup (0, +\infty)$

۲ ✓

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

۲ ✓

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

۲ ✓

الف) $\sin x - 1 \geq 0 \Rightarrow \sin x \geq 1$
 $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$
 $D_f = [\frac{\pi}{2}, \frac{3\pi}{2}]$

۲ ✓

ب) $\frac{x^3 - 9x^2}{x^3 - x} \geq 0 \Rightarrow \frac{x^2(x-9)}{x(x-1)} \geq 0$
 ریشه‌ها: $x = -1, 0, 1, 9$
 جدول علامت: $\begin{array}{c|ccccccc} & (-\infty, -1) & (-1, 0) & (0, 1) & (1, 9) & (9, \infty) \\ \hline \text{علامت} & + & - & + & - & + \end{array}$
 جواب: $x \in (-\infty, -1) \cup (0, 1) \cup (9, \infty)$

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ب) $|x| > 0 \Rightarrow x \neq 0$
 این عبارت برای اعداد مثبت برقرار است.
 $D_f = \mathbb{R}^+ \cup (0, +\infty)$

۲

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

۲

ب) $\frac{[x - \frac{1}{x}]}{[x - \frac{1}{x}]} + [x + \frac{1}{x}] \geq 0$
 $\Rightarrow 1 + [x + \frac{1}{x}] \geq 0$
 $\Rightarrow [x + \frac{1}{x}] \geq -1$
 $\Rightarrow x + \frac{1}{x} \geq -1 \Rightarrow x^2 + x + 1 \geq 0$
 $\Rightarrow x \in \mathbb{R}$
 $D_f = \{x | x = \frac{1}{k} + k, k \in \mathbb{Z}\}$

۴

ب) $\cos x - 1 \geq 0 \Rightarrow \cos x \geq 1$
 $\Rightarrow x = 2k\pi$
 $D_f = \{2k\pi | k \in \mathbb{Z}\}$

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سوال ۹ روشنیابی اینجا نوشتم.

الف) $\sin x \neq 1 \rightarrow \sin x \neq 1 \rightarrow x \neq \frac{\pi}{2} + 2k\pi$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2} + 2k\pi \mid k \in \mathbb{Z} \right\}$

د سوال

ب) $\sin x \neq -1 \rightarrow \sin x \neq -1 \rightarrow x \neq \frac{3\pi}{2} + 2k\pi$

$D_f = \mathbb{R} - \left\{ \frac{3\pi}{2} + 2k\pi \mid k \in \mathbb{Z} \right\}$

جواب

الف) $\sin x \leq \frac{1}{2} \rightarrow x \in \left[-\frac{\pi}{6}, \frac{\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6} \right]$

$D_f = \left[-\frac{\pi}{6}, \frac{\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6} \right]$

ب) $\sin x \geq \frac{1}{2} \rightarrow x \in \left[\frac{\pi}{6}, \frac{5\pi}{6} \right] \cup \left[\frac{7\pi}{6}, \frac{11\pi}{6} \right]$

$D_f = \left[\frac{\pi}{6}, \frac{5\pi}{6} \right] \cup \left[\frac{7\pi}{6}, \frac{11\pi}{6} \right]$

ج) $\sin x > \frac{1}{2} \rightarrow x \in \left(\frac{\pi}{6}, \frac{5\pi}{6} \right) \cup \left(\frac{7\pi}{6}, \frac{11\pi}{6} \right)$

$D_f = \left(\frac{\pi}{6}, \frac{5\pi}{6} \right) \cup \left(\frac{7\pi}{6}, \frac{11\pi}{6} \right)$

د سوال

الف) $\sin x < \frac{1}{2} \rightarrow x \in \left(-\frac{\pi}{6}, \frac{\pi}{6} \right) \cup \left(\frac{5\pi}{6}, \frac{7\pi}{6} \right)$

$D_f = \left(-\frac{\pi}{6}, \frac{\pi}{6} \right) \cup \left(\frac{5\pi}{6}, \frac{7\pi}{6} \right)$

ب) $\sin x \leq -\frac{1}{2} \rightarrow x \in \left[\frac{3\pi}{2}, \frac{7\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{3\pi}{2} \right]$

$D_f = \left[\frac{3\pi}{2}, \frac{7\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{3\pi}{2} \right]$

ج) $\sin x > -\frac{1}{2} \rightarrow x \in \left(\frac{3\pi}{2}, \frac{7\pi}{6} \right) \cup \left(\frac{5\pi}{6}, \frac{3\pi}{2} \right)$

$D_f = \left(\frac{3\pi}{2}, \frac{7\pi}{6} \right) \cup \left(\frac{5\pi}{6}, \frac{3\pi}{2} \right)$

د سوال

الف) $\sin x \neq 0 \rightarrow \sin x \neq 0 \rightarrow x \neq k\pi$

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

ب) $\sin x \neq 1 \rightarrow \sin x \neq 1 \rightarrow x \neq \frac{\pi}{2} + 2k\pi$

$D_f = \mathbb{R} - \left\{ \frac{\pi}{2} + 2k\pi \mid k \in \mathbb{Z} \right\}$

ج) $\sin x \neq -1 \rightarrow \sin x \neq -1 \rightarrow x \neq \frac{3\pi}{2} + 2k\pi$

$D_f = \mathbb{R} - \left\{ \frac{3\pi}{2} + 2k\pi \mid k \in \mathbb{Z} \right\}$

د سوال

الف) $\sin x \leq \frac{1}{2} \rightarrow x \in \left[-\frac{\pi}{6}, \frac{\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6} \right]$

$D_f = \left[-\frac{\pi}{6}, \frac{\pi}{6} \right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6} \right]$

ب) $\sin x \geq \frac{1}{2} \rightarrow x \in \left[\frac{\pi}{6}, \frac{5\pi}{6} \right] \cup \left[\frac{7\pi}{6}, \frac{11\pi}{6} \right]$

$D_f = \left[\frac{\pi}{6}, \frac{5\pi}{6} \right] \cup \left[\frac{7\pi}{6}, \frac{11\pi}{6} \right]$

ج) $\sin x > \frac{1}{2} \rightarrow x \in \left(\frac{\pi}{6}, \frac{5\pi}{6} \right) \cup \left(\frac{7\pi}{6}, \frac{11\pi}{6} \right)$

$D_f = \left(\frac{\pi}{6}, \frac{5\pi}{6} \right) \cup \left(\frac{7\pi}{6}, \frac{11\pi}{6} \right)$

د سوال