

الف) $x(x-1) \rightarrow x=0, x=1$ / $x(x^2-1) = x(x-1)(x+1) \rightarrow x=0, x=1, x=-1$
 $D_f = (-1, 0) \cup (0, 1) \cup [1, +\infty)$ (۲) ✓

ب) $x^3(x^2-1) = x^3(x-1)(x+1) \rightarrow x=0, x=1, x=-1$ / $x=0, x=1, x=-1$
 $D_f = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$

الف) $\begin{cases} x+|x| > 0 \rightarrow |x| > -x \leadsto D_f = (0, +\infty) \\ x+|x| \neq 0 \rightarrow x \neq -|x| \end{cases}$

ب) $x|x| > 0 \rightarrow D_f = (0, +\infty)$
 $x \neq 0$ (۲) ✓

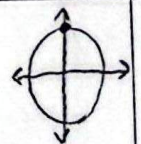
الف) $2-[x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3$
 $D_f = (-\infty, 3)$

ب) $2-[x] > 0 \rightarrow [x] < 2 \rightarrow x < 2$
 $D_f = (-\infty, 2)$ (۲) ✓

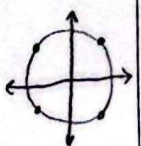
الف) $\left[x - \frac{1}{p} \right] + \left[x + \frac{1}{p} \right] \geq 0 \rightarrow \left[x + \frac{1}{p} \right] - 1 + \left[x + \frac{1}{p} \right] \geq 0 \rightarrow 2 \left[x + \frac{1}{p} \right] \geq 1 \rightarrow \left[x + \frac{1}{p} \right] \geq \frac{1}{2}$
 $\hookrightarrow \left[x + \frac{1}{p} - \frac{1}{p} \right] \quad D_f = \left[\frac{1}{p}, +\infty \right)$
 $x + \frac{1}{p} \geq 1 \Rightarrow x \geq \frac{1}{p}$

ب) $\left[x - \frac{1}{p} \right] + \left[-\left(x - \frac{1}{p} \right) \right] \geq 0 \xrightarrow{\text{if}} \begin{matrix} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{matrix} \Rightarrow x - \frac{1}{p} \in \mathbb{Z}$
 $D_f = \left\{ x \mid x = k + \frac{1}{p}, k \in \mathbb{Z} \right\}$ (۲) ✓

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



ب) $2 \sin^2 x - 1 \neq 0 \rightarrow 2 \sin^2 x \neq 1 \rightarrow \sin^2 x \neq \frac{1}{2} \rightarrow \sin x \neq \pm \frac{1}{\sqrt{2}} \rightarrow \sin x \neq \pm \frac{\sqrt{2}}{2}$
 $D_f = \mathbb{R} \cdot \left\{ \frac{k\pi + \frac{\pi}{4}}{2} \right\}$



الف) $2 \sin x - 1 \geq 0 \rightarrow 2 \sin x \geq 1 \rightarrow \sin x \geq \frac{1}{2}$
 $D_f = \left[2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6} \right]$



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

ج) ✓



الف) $-1 \leq |x-3| \leq 1 \rightarrow 2 \leq |x| \leq 4 \rightarrow \begin{cases} |x| \geq 2 \rightarrow x \geq 2, x \leq -2 \\ |x| \leq 4 \rightarrow -4 \leq x \leq 4 \end{cases} \rightarrow D_f = [-4, -2] \cup [2, 4]$

ب) $-1 \leq x^2 + 3x + 1 \leq 1 \rightarrow -1 \leq x^2 + 3x + 1 \rightarrow 0 \leq x^2 + 3x + 2 \rightarrow (x+1)(x+2) \geq 0$
 $D_f = [-3, -2] \cup [-1, 0]$

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-2	-1	0	1	2
+	+	-	-	+
+	+	-	-	+

الف) $\begin{cases} x-2 > 0 \rightarrow x > 2 \\ 2 \cdot \log_3(x-1) \geq 0 \rightarrow \log_3(x-1) \leq 2 \rightarrow x-1 \leq 9 \rightarrow x \leq 11 \end{cases} \rightarrow D_f = (2, 11]$

ب) $x^3 - x > 0 \rightarrow x(x^2 - 1) \rightarrow x(x-1)(x+1) > 0 \rightarrow x = 0, x = 1, x = -1$

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

-1	0	1
-	+	-
-	+	-

الف) $4^x + 1 \neq 0 \rightarrow 4^x \neq -1 \rightarrow D_f = \mathbb{R}$

ج) ✓

ب) $4^x - 2 \neq 0 \rightarrow 4^x \neq 2 \rightarrow x \neq \log_4 2$

$D_f = \mathbb{R} - \{\log_4 2\}$

ب) $4^x - 1 \neq 0 \rightarrow 4^x \neq 1 \rightarrow x \neq 0 \rightarrow D_f = \mathbb{R} - \{0\}$

ب) $4^x - 16 \neq 0 \rightarrow 4^x \neq 16 \rightarrow x \neq \log_4 16$

$D_f = \mathbb{R} - \{\log_4 16\}$

الف) $4^x + 1 \in W \rightarrow 4^x \in W - 1 \rightarrow x \in \frac{W-1}{4} \rightarrow D_f = \left\{ x \mid x = \frac{k-1}{4}, k \in W \right\}$

ج) ✓

ب) $\frac{4^x - 2}{4^x - 4} \in W \rightarrow \frac{4^x - 2}{4^x - 4} \in W \rightarrow 4^x - 2 \in W(4^x - 4) \rightarrow 4^x - 2 \in W - 4W \rightarrow x = \frac{4 - 4W}{4 - 4W}$

$D_f = \left\{ x \mid x = \frac{4 - 4k}{4 - 4k}, k \in W \right\}$