

الف) $x^2 - 20x + 100 = (x-10)^2 = 0$
 $\downarrow$
 $x=10$

$D = R - \{1, 10, 100\}$

①

$x^2 - 19x + 100 \neq 0 \rightarrow x^2 - 19x + 100 \neq 1 \rightarrow (x-10)^2 \neq 1 \rightarrow x-10 \neq \pm 1$
 $\begin{cases} x-10 \neq 1 \rightarrow x \neq 11 \\ x-10 \neq -1 \rightarrow x \neq 9 \end{cases}$
 $\rightarrow x \neq \frac{10}{1}$

ب) $x^2 - 19x + 100 = (x+1)(x^2 - 19x - 100)$
 $\downarrow$
 $x \neq -1$

$D = R - \{-1, 2\}$

$x^2 - 19x - 100 \neq 0 \rightarrow x^2 - 19x - 100 \neq 0 \rightarrow x^2 - 19x + 100 \neq 19 \rightarrow (x+2)^2 \neq 19 \rightarrow x+2 \neq \pm \sqrt{19} \rightarrow x \neq \frac{19}{2}$

الف) $x - \sqrt{4-2x} \neq 0 \rightarrow x \neq \sqrt{4-2x} \rightarrow x^2 \neq 4-2x \rightarrow x \neq 1$ $D = R - \{1\}$

②

ب) $x - \sqrt{4-2x} \neq 0 \rightarrow x \neq \sqrt{4-2x} \rightarrow x^2 \neq 4-2x \rightarrow x^2 - 4x + 4 \neq 0 \rightarrow (x-1)(x-2) \neq 0$
 $\downarrow \quad \downarrow$
 $x=1 \quad x=2$

$D = R - \{1, 2\}$

الف) $2\cos x - 1 \neq 0 \rightarrow 2\cos x \neq 1 \rightarrow \cos x \neq \frac{1}{2} \rightarrow x \neq \frac{\pi}{3}, \frac{5\pi}{3}$ $D_f = R - \{k\pi \pm \frac{\pi}{3}\}$

③

ب) $2\sin x + 1 \neq 0 \rightarrow \sin x \neq -\frac{1}{2} \rightarrow x \neq \frac{7\pi}{6}, \frac{11\pi}{6}$ $D_f = R - \{k\pi + \pi \pm \frac{\pi}{3}\}$

ج) $\cot x - 1 \neq 0 \rightarrow \cot x \neq 1 \rightarrow x \neq \frac{\pi}{4}, \frac{5\pi}{4}$ $\rightarrow \sin x \neq 0 \rightarrow x \neq k\pi$ (II)
 $\cos x \neq 0 \rightarrow x \neq \frac{\pi}{2}, \frac{3\pi}{2}$ (III)
 $D_f = R - \{k\pi, k\pi + \frac{\pi}{2}\}$

د) $f \sin^2 x - 3 \neq 0 \rightarrow f \sin^2 x \neq 3 \rightarrow \sin^2 x \neq \frac{3}{f} \rightarrow \sin x \neq \pm \sqrt{\frac{3}{f}}$
 $D_f = R - \{k\pi \pm \frac{\pi}{2}\}$

الف) $x^2 - 9x + 4 > 0 \rightarrow (x-2)(x-4) > 0$ $\frac{2}{+} \frac{4}{-}$ $D = (-\infty, 2) \cup (4, +\infty)$

④

ب) $x^2 - 9x + 4 < 0 \rightarrow (x-2)(x-4) < 0$ $\frac{2}{+} \frac{4}{-}$ $D = (2, 4)$

ج) $x^2 + 4x + 5 > 0 \rightarrow (x+1)(x+5) > 0$ $\frac{-1}{+} \frac{-5}{-}$ $D = R - (-5, -1)$

د) $x^2 - 4x + 4 \geq 0 \rightarrow (x-2)(x-2) \geq 0$ $\frac{2}{+} \frac{2}{-}$ $D = [2, 4]$

الف) $\frac{x^2 - 4x + 4}{x-2} < 0 \rightarrow \frac{(x-2)(x-2)}{x-2} < 0$ $\frac{1}{-} \frac{2}{+} \frac{2}{-}$ $D = (-\infty, 1) \cup (2, \infty)$

⑤

ب) $\frac{x^2 - 1}{x^2 - 4x + 4} > 0 \rightarrow \frac{(x+1)(x-1)}{(x-2)(x-2)} > 0$ $\frac{-1}{+} \frac{1}{-} \frac{2}{-} \frac{2}{+}$ $D = R - (-1, 2)$

الف) $\frac{x^2 - 4x + 4}{x^2 - 1} > 0 \rightarrow \frac{(x-2)(x-1)}{(x-1)(x+1)} > 0 \rightarrow \frac{1}{x-2} > 0 \rightarrow D = [2, +\infty)$

ب) $x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow x \neq \pm 1 \quad D = \mathbb{R} - \{\pm 1\}$

ج) $\log x^{x^2+x} \rightarrow x^2 - 4x > 0 \rightarrow \frac{x(x-4)}{x} > 0 \rightarrow \frac{0}{+} < \frac{+}{+} \rightarrow D = \mathbb{R} - [0, 4]$

د) $\log \frac{4-x^2}{|x|-2} \rightarrow \begin{cases} 4-x^2 > 0 \rightarrow (2-x)(2+x) > 0 \rightarrow x = \pm 2 \\ |x|-2 > 0 \rightarrow |x| > 2 \rightarrow x > 2 \text{ or } x < -2 \\ |x|-2 \neq 1 \rightarrow |x| \neq 3 \rightarrow x \neq \pm 3 \end{cases} \quad \frac{-}{+} < \frac{+}{+} \rightarrow D = (-2, 2) \cap (2, +\infty) \cap (-\infty, -2) \rightarrow D = (-2, -2) \cup (2, 2) - \{\pm 3\}$

هـ) $\log \frac{x^2 - 4x + 4}{x^2 - x} \rightarrow \frac{x^2 - 4x + 4}{x^2 - x} > 0 \rightarrow \frac{(x-2)(x-1)}{x(x-1)} > 0 \rightarrow \frac{x-2}{x} > 0 \rightarrow \frac{+}{+} < \frac{-}{+} \rightarrow D = (2, +\infty) \cap (-\infty, 1) \rightarrow (2, 1) - \{1\}$

و) $x^2 - 11x + 28 \rightarrow (x-4)(x-7) > 0 \rightarrow \frac{+}{+} < \frac{+}{+} \rightarrow \log x \rightarrow \sqrt{4-x^2} > 0 \rightarrow \frac{(4-x)(4+x)}{4} > 0 \rightarrow \frac{+}{+} < \frac{+}{+} \rightarrow D = (-4, 4)$

$\frac{x^2 - x}{x^2 + x} \rightarrow \frac{x(x-1)}{x(x+1)} \rightarrow \frac{-}{+} < \frac{+}{+} \rightarrow \frac{-}{+} < \frac{+}{+}$

	-1	0	1	
x	+	+	+	+
x-1	-	-	-	+
x+1	-	+	+	+
P	+	-	-	+

$\frac{x-f(x)}{f(x)} \rightarrow -1 > 0 \rightarrow x_2 - 2$

	-2	-1	1	2	
x-f(x)	-	-	+	+	-
f(x)	+	+	-	-	+
P	-	+	-	+	-

$D = (-2, -1] \cup (1, 2]$

