

الف) $y = \frac{x+4}{4x^3 - 4x^2 + 3x - 12} \Rightarrow \frac{x+4}{(x-1)(4x^2 - 4x + 12)}$ $\Rightarrow D = \mathbb{R} - \{1\}$

ب) $y = \frac{x+3}{3x^3 - x^2 - 12x - 4} \Rightarrow \frac{x+3}{(x+1)(3x^2 - 4x - 4)}$ $\Rightarrow D = \mathbb{R} - \{-1, \frac{2}{3}\}$

الف) $y = \frac{x+1}{x - \sqrt{3x-2}}$ $\left\{ \begin{array}{l} 3x-2 \geq 0 \Rightarrow x \geq \frac{2}{3} \Rightarrow \frac{x}{x} \geq \frac{2}{3} \\ x \neq \sqrt{3x-2} \Rightarrow x^2 \neq 3x-2 \Rightarrow x^2 - 3x + 2 \neq 0 \\ x(x-2) \neq 0 \Rightarrow x \neq 0, 2 \end{array} \right\} \Rightarrow D = \left[\frac{2}{3}, \infty\right) - \{0, 2\}$

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الف) $y = \frac{\sin x}{2\cos x - 1} \rightarrow 2\cos x - 1 \neq 0 \Rightarrow \cos x \neq \frac{1}{2} \Rightarrow D = \mathbb{R} - \{2k\pi + \frac{\pi}{3}, 2k\pi + \frac{5\pi}{3}\}$

ب) $y = \frac{\cos x + 1}{2\sin x + 1} \rightarrow 2\sin x + 1 \neq 0 \Rightarrow \sin x \neq -\frac{1}{2} \Rightarrow D = \mathbb{R} - \{2k\pi + \frac{7\pi}{6}, 2k\pi + \frac{11\pi}{6}\}$

ج) $y = \frac{\tan x + 2}{\cot x - 1} \rightarrow \left\{ \begin{array}{l} \cot x \neq 1 \\ \sin x \neq 0 \end{array} \right\} \Rightarrow D = \mathbb{R} - \{k\pi + \frac{\pi}{4}, k\pi\}$

د) $y = \frac{\sin x + 1}{2\sin^2 x - 3} \rightarrow \sin x \neq \pm \frac{\sqrt{3}}{2} \Rightarrow D = \mathbb{R} - \{k\pi + \frac{\pi}{6}, k\pi + \frac{5\pi}{6}\}$

الف) $x^2 - 8x + 6 > 0 \Rightarrow (x-2)(x-6) \Rightarrow \frac{2}{+1} - \frac{6}{+1} \Rightarrow D = (-\infty, 2) \cup (6, \infty)$

ب) $x^2 - 4x + 8 < 0 \Rightarrow (x-2)(x-1) \Rightarrow \frac{1}{+1} - \frac{2}{+1} \Rightarrow D = (1, 2)$

ج) $x^2 + 6x + 8 \geq 0 \Rightarrow \left\{ \begin{array}{l} x = -1 \\ x = -8 \end{array} \right\} \Rightarrow \frac{-8}{+1} - \frac{-1}{+1} \Rightarrow D = (-\infty, -8] \cup [-1, \infty)$

د) $x^2 - 7x + 6 \leq 0 \Rightarrow (x-1)(x-6) \Rightarrow \frac{1}{+1} - \frac{6}{+1} \Rightarrow D = [1, 6]$

الف) $\frac{x^2 - 3x + 2}{x - 2} < 0 \Rightarrow \frac{(x-1)(x-2)}{(x-2)} \Rightarrow \frac{1}{-1} + \frac{2}{+1} - \frac{2}{+1} \Rightarrow D = (-\infty, 1) \cup (2, \infty)$

ب) $\frac{x^2 - 1}{x^2 - 6x + 8} > 0 \Rightarrow \frac{(x+1)(x-1)}{(x-2)(x-4)} \Rightarrow \frac{-1}{+1} - \frac{1}{+1} + \frac{2}{-1} - \frac{4}{-1} \Rightarrow D = (-\infty, -1] \cup (2, \infty)$

الف) $y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \Rightarrow \frac{(x-3)(x-1)}{(x-1)(x+1)} \Rightarrow \frac{-1}{x+1}$
 $\Rightarrow D = [3, +\infty)$

ب) $\sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \Rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1 \Rightarrow D = \mathbb{R} \setminus \{\pm 1\}$

الف) $\log(x^2 - 3x) \Rightarrow x(x-3) > 0 \Rightarrow \frac{0}{x} - \frac{3}{x+1} \Rightarrow D = (-\infty, 0) \cup (3, +\infty)$

ب) $\log \frac{1-x}{1+x} \Rightarrow \begin{cases} (1+x)(1-x) > 0 \\ 1+x > 0 \\ 1-x \neq 0 \end{cases} \Rightarrow \frac{-1}{x} + \frac{1}{x+1} \Rightarrow D = (1, 3) - \{2\}$

ج) $\log \frac{x^2 - 4x + 1}{x-1} \Rightarrow \begin{cases} (x-4)(x-1) > 0 \\ 1-x > 0 \\ 1-x \neq 0 \end{cases} \Rightarrow \frac{x}{x-1} - \frac{4}{x+1} \Rightarrow D = (4, 10) - \{9\}$

د) $y = \sqrt{x^2 - 11x + 21} + \log \frac{\sqrt{36-x^2}}{x} \Rightarrow \begin{cases} (x-6)(x-3) > 0 \\ (6-x)(6+x) > 0 \\ x \neq 0 \end{cases} \Rightarrow \frac{6}{x} - \frac{3}{x+1} \Rightarrow D = (-\infty, 3] \cup [6, +\infty) - \{1\}$

$y = \frac{x^2 - x}{x^2 + x} \Rightarrow \frac{x(x-1)}{x(x+1)} \Rightarrow \frac{-1}{x+1} + \frac{1}{x}$

$y = \frac{x^2 - x}{x^2 + x} \Rightarrow \frac{x(x-1)}{x(x+1)}$

	-1	0	1
x	+	-	+
(x-1)	-	+	-
(x+1)	-	+	-

$y = \sqrt{\frac{x-f(x)}{f(x)}}$

$y=f(x)$	0	-1	0	1	+
$x=f(x)$	+	0	-	0	+
	-	0	+	0	+

$\Rightarrow D = [-1, 0) \cup [1, +\infty)$

الف) $f(x) + 1$

ب) $(x-1)$

ج) $1 - f(x)$

د) $(x+1) + 2$

