

الف) $\frac{x^3 + 2x^2 - 12x + 3}{x-1} = x^2 + 3x - 9$ $\Rightarrow x^3 + 2x^2 - 12x + 3 = (x-1)(x^2 + 3x - 9)$ $\Rightarrow x^3 + 2x^2 - 12x + 3 = x^3 + 3x^2 - 9x - x^2 - 3x + 9$ $\Rightarrow x^3 + 2x^2 - 12x + 3 = x^3 + 2x^2 - 12x + 9$ $\Rightarrow 3 = 9$ $\Rightarrow x_1 = 1$ $\Rightarrow D_f = \mathbb{R} - \{1\}$ ✓

ب) $\frac{x^3 + 9x^2 + 10x + 3}{x+1} = x^2 + 8x + 3$ $\Rightarrow x^3 + 9x^2 + 10x + 3 = (x+1)(x^2 + 8x + 3)$ $\Rightarrow x^3 + 9x^2 + 10x + 3 = x^3 + 8x^2 + 3x + x^2 + 8x + 3$ $\Rightarrow x^3 + 9x^2 + 10x + 3 = x^3 + 9x^2 + 11x + 3$ $\Rightarrow 10x = 11x$ $\Rightarrow x = 0$ $\Rightarrow D_f = \mathbb{R} - \{0\}$ ✓

ج) $\frac{x^3 - 2x^2 + 3x - 1}{x-1} = x^2 - x + 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = (x-1)(x^2 - x + 1)$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - x^2 + x - x^2 + x - 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - 2x^2 + 2x - 1$ $\Rightarrow 3x = 2x$ $\Rightarrow x = 0$ $\Rightarrow D_f = \mathbb{R} - \{1\}$ ✓

د) $\frac{x^3 - 2x^2 + 3x - 1}{x-1} = x^2 - x + 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = (x-1)(x^2 - x + 1)$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - x^2 + x - x^2 + x - 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - 2x^2 + 2x - 1$ $\Rightarrow 3x = 2x$ $\Rightarrow x = 0$ $\Rightarrow D_f = \mathbb{R} - \{1\}$ ✓

ه) $\frac{x^3 - 2x^2 + 3x - 1}{x-1} = x^2 - x + 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = (x-1)(x^2 - x + 1)$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - x^2 + x - x^2 + x - 1$ $\Rightarrow x^3 - 2x^2 + 3x - 1 = x^3 - 2x^2 + 2x - 1$ $\Rightarrow 3x = 2x$ $\Rightarrow x = 0$ $\Rightarrow D_f = \mathbb{R} - \{1\}$ ✓

الف) $\frac{(x+1)^2}{(x+2)^2} = \frac{x^2 + 1 + 2x}{x^2 + 4 + 4x}$ $\Rightarrow \frac{x^2 + 2x + 1}{x^2 + 4x + 4} = \frac{x^2 + 2x + 1}{x^2 + 4x + 4}$ $\Rightarrow D_f = \mathbb{R} - \{-2\}$ ✓

ب) $\frac{(x+1)^2}{(x+2)^2} = \frac{x^2 + 1 + 2x}{x^2 + 4 + 4x}$ $\Rightarrow \frac{x^2 + 2x + 1}{x^2 + 4x + 4} = \frac{x^2 + 2x + 1}{x^2 + 4x + 4}$ $\Rightarrow D_f = \mathbb{R} - \{-2\}$ ✓

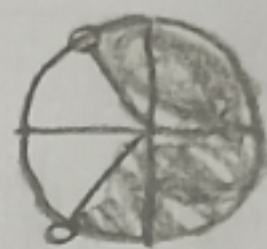
الف) $x > 0$ I $1 - \log x > 0 \Rightarrow \log x < 1 \Rightarrow x < 10$ II $\Rightarrow D_f = I \cap II = (0, 10)$ ✓

ب) $x > 0$ I $1 - \log \frac{1}{x} > 0 \Rightarrow \log \frac{1}{x} < 1 \Rightarrow \frac{1}{x} < 10 \Rightarrow x > \frac{1}{10}$ II $\Rightarrow D_f = I \cap II = (\frac{1}{10}, \infty)$ ✓

$$\log_a \frac{x-1}{x} \leq 1 \rightarrow x \leq 3$$

$$\left. \begin{array}{l} x-1 > 0 \\ x > 1 \\ x > \frac{1}{2} \text{ I } \checkmark \\ \log_a \frac{x-1}{x} > 0 \rightarrow x-1 > 1 \\ x > 2 \\ \checkmark x > 1 \text{ II} \end{array} \right\} D_x = I \cap \text{II} = (1, 3]$$

$$\text{c) } 1 < \cos x + 1 > 0 \rightarrow 1 < \cos x < -1 \rightarrow \cos x < -\frac{1}{2}$$



$$D_x = \left(\frac{2\pi}{3}, \frac{4\pi}{3} \right)$$

$$\text{b) } \log \frac{x-1}{x+1} > 0 \rightarrow \frac{x-1}{x+1} > 1 \rightarrow x-1 > x+1 \rightarrow -2 > 2 \rightarrow \text{no solution}$$

$$\frac{x-1}{x+1} > 1 \rightarrow x < -1$$

$$D_x = (-\infty, -1)$$

$$x^2 + ax + b = 0 \rightarrow a + 2 = 0 \rightarrow a = -2$$

$$x = 3 \rightarrow -9 + 6 + b = 0 \rightarrow b = 3$$

$$x^2 + (a+1)x - m^2 > 0 \rightarrow x^2 + x - m^2 > 0$$

$$x^2 + x - m^2 = 0 \rightarrow x = \frac{-1 \pm \sqrt{1+4m^2}}{2}$$

$$-1 \leq m \leq 1$$

$$[a] + [-a] \stackrel{!}{=} 0 \Rightarrow [a] + [-a] + 1 = 1$$

$$x-1 > 0 \rightarrow x > 1 \Rightarrow -1 < x < 1 \rightarrow \text{no solution}$$