

الف) $y = \frac{x+3}{x^3+x^2-1x+3}$
 $(x^3+3x-4)(x-1) \neq 0$
 $\frac{1}{x} \rightarrow -3 \rightarrow 1$

$\frac{-x^3+x^2-1x+3}{x^3+x^2-1x+3} \cdot \frac{x-1}{x-1}$
 $\frac{-x^3+x^2-1x+3}{x^3+x^2-1x+3} \rightarrow x^3+3x-4=0 \rightarrow x=-3$
 $D_f = \mathbb{R} - \{-3, \frac{1}{x}, 1\}$

ب) $y = \frac{x+3}{x^3+9x^2+10x+3}$
 $(x^3+7x+3)(x+1) \neq 0$
 $\frac{1}{x} \rightarrow -3 \rightarrow -1$

$\frac{-x^3+9x^2+10x+3}{x^3+9x^2+10x+3} \cdot \frac{x+1}{x+1}$
 $\frac{-x^3+9x^2+10x+3}{x^3+9x^2+10x+3} \rightarrow x^3+7x+3=0 \rightarrow x=-3$
 $D_f = \mathbb{R} - \{-3, -1, -\frac{1}{x}\}$

الف) $y = \frac{x+3}{x^3-2x^2+1x-1}$
 $(x^3-x+1)(x-1) \neq 0$
 $\Delta \neq 0$

$\frac{-x^3-2x^2+1x-1}{x^3-2x^2+1x-1} \cdot \frac{x-1}{x-1}$
 $\frac{-x^3-2x^2+1x-1}{x^3-2x^2+1x-1} \rightarrow x^3-x+1=0$
 $D_f = \mathbb{R} - \{1\}$

ب) $y = \sqrt{\frac{x+3}{x^3-2x^2+1x-1}} \Rightarrow \frac{x+3}{(x^3-x+1)(x-1)} \geq 0$
 $\frac{-1}{x+3} \cdot \frac{1}{x-1} \geq 0$
 $D_f = (-\infty, -3] \cup (1, +\infty)$

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

الف) $y = \sqrt{[-x]-2} \rightarrow [-x]-2 \geq 0 \rightarrow [-x] \geq 2 \rightarrow [x] \leq -2 \rightarrow D_f = (-\infty, -2]$

ب) $y = \frac{5x^2+4}{[x]^2-1[x]-1}$
 $[x]^2-1[x]-1=0 \rightarrow [x] = -1 \rightarrow (0, -1]$
 $[x] = +3 \rightarrow [3, 4)$
 $D_f = [-1, 0) \cup [3, 4)$

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

ب) $y = \sqrt{[x-\frac{1}{x}]+[\frac{1}{x}-x]}$
 $x-\frac{1}{x} \in \mathbb{Z} \rightarrow x \in \mathbb{Z} + \frac{1}{x}$
 $D_f = \{x | x = k + \frac{1}{x}, k \in \mathbb{Z}\}$

