

الف) $y = \log \frac{a-x}{a+x}$
 $a-x > 0 \rightarrow x < a$
 $a+x > 0 \rightarrow x > -a$
 $D_f = (a, -a) - \{0\}$

ب) $y = \log \frac{x-1}{x+1}$
 $x-1 > 0 \rightarrow x > 1$
 $x+1 > 0 \rightarrow x > -1$
 $D_f = (-1, -1) \cup (1, +\infty) - \{-1\}$

الف) $y = \log \frac{x^2 - 5x + 7}{x-3}$
 $(x-3)(x-1) > 0 \rightarrow x-3 \neq 0 \rightarrow x \neq 3$
 $x-3 > 0 \rightarrow x > 3$
 $D_f = (3, +\infty) - \{3\}$

ب) $y = \log \frac{x^2 - 5x + 7}{x-3}$
 $x-3 > 0 \rightarrow x > 3$
 $D_f = (-\infty, -3) \cup (3, +\infty) - \{-3\}$

الف) $y = \sqrt{x - \log \frac{x-1}{x}}$
 $x-1 > 0 \rightarrow x > 1$
 $x-1 \leq 1 \rightarrow x \leq 2$
 $x - \log \frac{x-1}{x} > 0 \rightarrow \log \frac{x-1}{x} \leq x$
 $x \leq 1$
 $D_f = (1, 2]$

ب) $y = \log (x \log \frac{x}{x-1} - 1)$ $x > 0$
 $x \log \frac{x}{x-1} - 1 > 0 \rightarrow x \log \frac{x}{x-1} > 1 \rightarrow \log \frac{x}{x-1} > \frac{1}{x}$
 $x > \frac{1}{x} \rightarrow x > \sqrt{x}$
 $D_f = (\sqrt{x}, +\infty)$

الف) $y = \frac{x}{x^2 + 1}$
 $x^2 + 1 \neq 0$
 $D_f = \mathbb{R}$

ب) $y = \frac{x}{x^2 - 1}$
 $x^2 - 1 \neq 0$
 $D_f = \mathbb{R} - \{0, 1, -1\}$

الف) $y = \frac{x}{x^2 - 1}$
 $x^2 - 1 \neq 0$
 $D_f = \mathbb{R} - \{0\}$

ب) $y = \frac{x}{x^2 - 1}$
 $x^2 - 1 \neq 0$
 $D_f = \mathbb{R} - \{\frac{1}{x}\}$

الف) $y = (x+1)!$
 $D_f = \{x \mid x = \frac{k-1}{x}, k \in \mathbb{N}\}$

ب) $y = (\frac{x-1}{x-a})!$
 $D_f = \{x \mid x = \frac{ak-r}{xk-r}, k \in \mathbb{N}, k \neq \frac{a}{1}\}$