

الف) $y = \frac{x+5}{x^3 - 2x^2 + 3x - 15} \rightarrow \frac{x+5}{(x-1)(x^2-2)(x-5)} \rightarrow x \neq 1, \frac{5}{2}, 5 \rightarrow D_f = R - \left\{1, \frac{5}{2}, 5\right\}$

ب) $y = \frac{x+3}{x^3 - x^2 - 12x - 5} \rightarrow \frac{x+3}{(x+1)(x-4)(x+3)} \rightarrow x \neq -1, 4, -3 \rightarrow D_f = R - \left\{-1, 4, -3\right\}$

الف) $y = \frac{x+1}{x - \sqrt{3-2x}} \begin{cases} 3-2x \geq 0 \rightarrow x \leq \frac{3}{2} \\ x - \sqrt{3-2x} \neq 0 \rightarrow x \neq \sqrt{3-2x} \rightarrow x^2 \neq 3-2x \rightarrow x^2 + 2x - 3 \neq 0 \rightarrow (x-1)(x+3) \neq 0 \end{cases}$
 $D_f = (-\infty, \frac{3}{2}] - \{1\}$

ب) $y = \frac{x+2}{x\sqrt{3x-2}} \begin{cases} 3x-2 \geq 0 \rightarrow 3x \geq 2 \rightarrow x \geq \frac{2}{3} \\ x - \sqrt{3x-2} \neq 0 \rightarrow x \neq \sqrt{3x-2} \rightarrow x^2 \neq 3x-2 \rightarrow x^2 - 3x + 2 \neq 0 \rightarrow (x-1)(x-2) \neq 0 \end{cases}$
 $D_f = [\frac{2}{3}, \infty) - \{1, 2\}$

الف) $y = \frac{\sin x}{r \cos x - 1} \rightarrow r \cos x - 1 \neq 0 \rightarrow r \cos x \neq 1 \rightarrow \cos x \neq \frac{1}{r} \rightarrow D_f = R - \left\{r k \pi \pm \frac{\pi}{r}\right\}$

ب) $y = \frac{\cos x + 1}{r \sin x + 1} \rightarrow r \sin x + 1 \neq 0 \rightarrow \sin x \neq -\frac{1}{r} \rightarrow D_f = R - \left\{r k \pi + \frac{\pi}{r}, r k \pi + \frac{3\pi}{r}\right\}$

ج) $y = \frac{\tan x + 2}{\cot x - 1} \rightarrow \begin{cases} \cot x \neq 1 \rightarrow k\pi + \frac{\pi}{2} \\ \sin x \neq 0 \rightarrow k\pi \end{cases} \rightarrow D_f = R - \left\{k\pi, k\pi + \frac{\pi}{2}\right\}$

د) $y = \frac{\sin^2 x + 1}{\sin^2 x - 3} \rightarrow \sin^2 x - 3 \neq 0 \rightarrow \sin^2 x \neq 3 \rightarrow \sin^2 x \neq \frac{3}{2} \rightarrow \sin x \neq \pm \frac{\sqrt{3}}{2} \rightarrow D_f = R - \left\{r k \pi + \frac{\pi}{3}, r k \pi + \frac{2\pi}{3}\right\}$

الف) $x^2 - 8x + 6 > 0 \rightarrow (x-2)(x-3) \rightarrow \frac{2}{x-2} > \frac{3}{x-3} \rightarrow (-\infty, 2) \cup (3, \infty)$

ب) $x^2 - 6x + 5 < 0 \rightarrow (x-1)(x-5) \rightarrow \frac{1}{x-1} < \frac{5}{x-5} \rightarrow (1, 5)$

ج) $x^2 + 4x + 5 \geq 0 \rightarrow (x+1)(x+5) \rightarrow \frac{-5}{x+1} \geq \frac{-1}{x+5} \rightarrow (-\infty, -5] \cup [-1, \infty)$

د) $x^2 - 4x + 4 \leq 0 \rightarrow (x-1)(x-4) \rightarrow \frac{1}{x-1} \leq \frac{4}{x-4} \rightarrow [1, 4]$

الف) $\frac{x^2 - 3x + 2}{x - 5} < 0 \rightarrow \frac{(x-1)(x-2)}{x-5} < 0 \rightarrow \frac{1}{x-1} > \frac{2}{x-5} \rightarrow (-\infty, 1) \cup (5, \infty)$

(الف) $\frac{(x-1)(x+1)}{x^2 - 6x + 5} > 0 \rightarrow \frac{(x-1)(x+1)}{(x-1)(x-5)} > 0 \rightarrow \frac{1}{x-1} > \frac{5}{x-5} \rightarrow (-\infty, -1] \cup (5, \infty), x \neq 1$

$$الف) y = \sqrt{\frac{x^2 - 5x + 3}{x^2 - 1}} \rightarrow \begin{cases} x^2 - 5x + 3 \geq 0 \rightarrow (x-1)(x-3) \rightarrow x \in (-\infty, 1] \cup [3, \infty) \\ x^2 - 1 > 0 \rightarrow x^2 > 1 \rightarrow x > 1 \end{cases} \rightarrow D_f = [3, \infty)$$

$$ب) y = \sqrt{\frac{x^2 - 5x + 3}{x^2 - 1}} \rightarrow x^2 - 1 \neq 0 \rightarrow x \neq \pm 1 \rightarrow D_f = \mathbb{R} - \{-1, 1\}$$

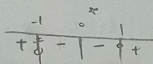
$$ج) y = \log(x^2 - 3x) \rightarrow x^2 - 3x > 0 \rightarrow x(x-3) > 0 \rightarrow \begin{matrix} x & 0 & 3 \\ + & - & + \end{matrix} \rightarrow D_f = (-\infty, 0) \cup (3, \infty)$$

$$د) y = \log \frac{1-x^2}{1-x} \rightarrow \begin{cases} 1-x^2 > 0 \rightarrow -1 < x < 1 \\ 1-x > 0 \rightarrow x < 1 \\ 1-x^2 > 0 \rightarrow |x| > 1 \rightarrow x > 1, x < -1 \end{cases} \rightarrow D_f = (-5, -3) \cup (-3, -2) \cup (3, 3) \cup (3, 5)$$

$$هـ) y = \log \frac{x^2 - 3x + 1}{1-x} \rightarrow \begin{cases} x^2 - 3x + 1 > 0 \rightarrow x < 1, x > 2 \\ 1-x > 0 \rightarrow x < 1 \end{cases} \rightarrow D_f = (5, 9) \cup (9, 10)$$

$$و) y = \sqrt{x^2 - 11x + 21} + \log x \rightarrow \begin{cases} x^2 - 11x + 21 \geq 0 \rightarrow (x-3)(x-7) \geq 0 \rightarrow x \leq 3, x \geq 7 \\ x > 0 \end{cases} \rightarrow D_f = (0, 3) \cup (7, \infty)$$

$$ز) y = \frac{x^2 - x}{x^2 + x} \rightarrow x(x-1) \rightarrow x > 1, x < 0 \rightarrow D_f = (0, 1) \cup (1, \infty)$$

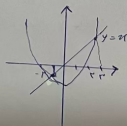


	-1	0	1	
$x^2 - x$	+	+	-	+
$x^2 + x$	+	-	+	+
$P(x)$	+	-	-	+

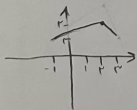
$$ي) y = \frac{x - f(x)}{f(x)} \rightarrow x - f(x) = 0 \rightarrow x = f(x) \rightarrow x = -1, 3$$

$$f(x) = 0 \rightarrow x = -3, 5$$

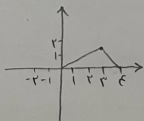
$$D_f = (-\infty, -3) \cup (-1, 3) \cup (5, \infty)$$



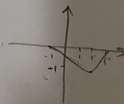
$$الف) f(x) + 1$$



$$ب) f(x-1)$$



$$ج) -f(x)$$



$$د) f(x+1) + 2$$

