



الف) $\frac{(x-2)(x-3)}{x-1} > 0$

1 2 3

+ - +

$\mathcal{D}_f = (-\infty, 1) \cup (3, +\infty)$

ب) $\frac{(x-1)(x-5)}{x-2} < 0$

1 2 5

+ - +

$\mathcal{D}_f = (1, 2) \cup (5, +\infty)$

ج) $\frac{(x+3)(x+2)}{x-1} \geq 0$

-3 -2 1

+ - +

$\mathcal{D}_f = (-\infty, -3] \cup [-2, +\infty)$

د) $\frac{(x-4)(x-1)}{x-2} \leq 0$

1 2 4

+ - +

$\mathcal{D}_f = [1, 2] \cup [4, +\infty)$

الف) $\frac{(x-2)(x-1)}{x-5} < 0$

1 2 5

- + -

$\mathcal{D}_f = (-\infty, 1) \cup (2, 5)$

ب) $\frac{(x-1)(x+1)}{(x-5)(x-1)} \geq 0$

-1 1 5

+ - -

$\mathcal{D}_f = (-\infty, -1] \cup (5, +\infty)$

الف) $\frac{(x-1)(x^2+1+x)}{x(x-1)(x+1)} \geq 0$

-1 0 1

+ - +

$\mathcal{D}_f = (-\infty, -1) \cup (0, +\infty) - \{1\}$

الف) ① $2-x \geq 0 \Rightarrow x \leq 2$

② $4-\sqrt{2-x} \geq 0 \Rightarrow 4 \geq \sqrt{2-x}$

$\Rightarrow -14 \leq x$

$\mathcal{D}_f = [-14, 2]$

ب) $\frac{(x+4)(x-4)}{(x-4)(x-1)} \geq 0$

-4 1 4

+ - +

$\mathcal{D}_f = (-\infty, -4] \cup (1, +\infty) - \{4\}$

ب) ① $x-2 \geq 0 \Rightarrow x \geq 2$

② $3-\sqrt{x-2} \geq 0 \Rightarrow 3 \geq \sqrt{x-2}$

$\Rightarrow 9 \geq x-2 \Rightarrow 11 \geq x$

$\mathcal{D}_f = [2, 11]$

الف) $\sqrt{2} - 2x^2 \geq 0$ $2 \geq x^2$ $\sqrt{2} \geq x \rightarrow -\sqrt{2} \leq x \leq \sqrt{2}$ $D_f = [-\sqrt{2}, \sqrt{2}]$	ب) $3 x - 9 \geq 0$ $ x \geq 3$ $\begin{matrix} \nearrow x \geq 3 \\ \searrow x \leq -3 \end{matrix}$ $D_f = [3, +\infty) \cup (-\infty, -3]$	6
الف) $ x - 3 \neq 0 \rightarrow x \neq \pm 3$ $D_f = \mathbb{R} - \{\pm 3\}$	ب) $\sqrt{x} - 9 \neq 0 \rightarrow \sqrt{x} \neq 9$ $x \neq 81$ $D_f = \mathbb{R} - \{81\}$	7
الف) $\cos x \neq \frac{1}{2} = \cos \frac{\pi}{3}$ $\rightarrow \frac{\omega \pi}{2}$ $D_f = \mathbb{R} - \{2k\pi \pm \frac{\pi}{3}\}$	ب) $\sin x \neq -\frac{1}{2}$ $D_f = \mathbb{R} - \{2k\pi + \frac{4\pi}{3}, 2k\pi + \frac{5\pi}{3}\}$ $\rightarrow 2k\pi + \frac{11\pi}{3}$	8
	ج) $\cos x \neq 1$ $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2}\}$ د) $\sin x \neq \pm \frac{\sqrt{2}}{2}$ $D_f = \mathbb{R} - \{k\pi \pm \frac{\pi}{4}\}$	
$2 x-2 - \frac{1}{x} > 0 \rightarrow x-2 > \frac{1}{x}$ $\begin{matrix} \nearrow x-2 > \frac{1}{x} \rightarrow x > \frac{9}{x} \\ \searrow x-2 < -\frac{1}{x} \rightarrow x < \frac{5}{x} \end{matrix}$ $D_f = (\frac{5}{x}, \frac{9}{x})$		9
الف) $2 - 2 x \geq 0 \rightarrow 2 \geq x $ $\rightarrow -2 \leq x \leq 2$ $D_f = [-2, 2]$	ب) $ x \neq 0$ $x \neq 0$ $D_f = \mathbb{R} - \{0\}$	10