

الف) $x^3 - 2x^2 + 3x - 15 = 0$ $\Rightarrow x^2 - 2x + 3 = \frac{15}{x}$ $\Rightarrow x^3 - 2x^2 + 3x - 15 = 0$ $\Rightarrow (x-1)(x^2 - x + 3) = 0$ $\Rightarrow x = 1$ or $x = \frac{1 \pm \sqrt{1-12}}{2}$ $\Rightarrow x = 1$ or $x = \frac{1 \pm i\sqrt{11}}{2}$

ب) $x^3 - 2x^2 + 3x - 15 = 0$ $\Rightarrow x^2 - 2x + 3 = \frac{15}{x}$ $\Rightarrow x^3 - 2x^2 + 3x - 15 = 0$ $\Rightarrow (x-1)(x^2 - x + 3) = 0$ $\Rightarrow x = 1$ or $x = \frac{1 \pm \sqrt{1-12}}{2}$ $\Rightarrow x = 1$ or $x = \frac{1 \pm i\sqrt{11}}{2}$

الف) $y = \frac{x+1}{x\sqrt{x-2}}$ $\Rightarrow x-2 \geq 0 \Rightarrow x \geq 2$ $\Rightarrow x \leq \frac{1}{x}$ $\Rightarrow x^2 \leq 1$ $\Rightarrow x \leq 1$ $\Rightarrow x = 2$ $\Rightarrow y = \frac{3}{2\sqrt{0}}$ $\Rightarrow y = \frac{3}{2}$ $\Rightarrow D = (-\infty, \frac{3}{2}] - \{1\}$

ب) $y = \frac{x+2}{x-\sqrt{x-2}}$ $\Rightarrow x-2 \geq 0 \Rightarrow x \geq 2$ $\Rightarrow x \geq \frac{2}{x}$ $\Rightarrow x^2 \geq 2$ $\Rightarrow x \geq \sqrt{2}$ $\Rightarrow x = 2$ $\Rightarrow y = \frac{4}{2-\sqrt{0}}$ $\Rightarrow y = 2$ $\Rightarrow D = (\frac{2}{x}, +\infty) - \{1, 2\}$

الف) $y = \frac{\sin x}{\cos x - 1}$ $\Rightarrow \cos x - 1 \neq 0 \Rightarrow \cos x \neq 1 \Rightarrow x \neq 2k\pi$ $\Rightarrow D = R - \{2k\pi\}$

ب) $y = \frac{\cos x + 1}{\sin x + 1}$ $\Rightarrow \sin x + 1 \neq 0 \Rightarrow \sin x \neq -1 \Rightarrow x \neq \frac{3\pi}{2} + 2k\pi$ $\Rightarrow D = R - \{\frac{3\pi}{2} + 2k\pi\}$

ج) $y = \frac{\tan x + 1}{\cot x - 1}$ $\Rightarrow \cot x - 1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow x \neq \frac{\pi}{4} + k\pi$ $\Rightarrow D = R - \{\frac{\pi}{4} + k\pi\}$

د) $y = \frac{\sin x + 1}{\sin^2 x - 3}$ $\Rightarrow \sin^2 x - 3 \neq 0 \Rightarrow \sin^2 x \neq 3$ $\Rightarrow \sin x \neq \pm\sqrt{3}$ $\Rightarrow D = R - \{x \mid \sin x = \pm\sqrt{3}\}$

الف) $x^2 - 2x + 4 > 0 \Rightarrow (x-1)(x-3) > 0 \Rightarrow x < 1$ or $x > 3 \Rightarrow (-\infty, 1) \cup (3, +\infty)$

ب) $x^2 - 4x + 5 < 0 \Rightarrow (x-1)(x-5) < 0 \Rightarrow 1 < x < 5 \Rightarrow (1, 5)$

ج) $x^2 + 2x + 5 > 0 \Rightarrow (x+1)(x+5) > 0 \Rightarrow x < -5$ or $x > -1 \Rightarrow (-\infty, -5) \cup (-1, +\infty)$

د) $x^2 - 7x + 4 \leq 0 \Rightarrow (x-1)(x-4) \leq 0 \Rightarrow 1 \leq x \leq 4 \Rightarrow [1, 4]$

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

ب) $\frac{x^2 - 1}{x^2 - 4x + 5} > 0 \Rightarrow \frac{(x-1)(x+1)}{(x-1)(x-5)} > 0 \Rightarrow x < -1$ or $x > 5 \Rightarrow (-\infty, -1) \cup (5, +\infty)$

$$\text{الف) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \rightarrow \frac{(x-1)(x-3)}{(x-1)(x^2+1)} > 0 \quad \frac{1}{x-1} \cdot \frac{x-3}{x^2+1} \rightarrow D: [3, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \Rightarrow x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow x \neq \pm 1 \rightarrow D: \mathbb{R} - \{\pm 1\}$$

$$\text{الف) } \text{Zag } (x^2 - 3x) \rightarrow x^2 - 3x > 0 \rightarrow x(x-3) > 0 \rightarrow \frac{x}{x-3} \rightarrow D: (-\infty, 0) \cup (3, +\infty)$$

$$\text{ب) } \text{Zag } \begin{cases} |x-2| < 1 \rightarrow 1 < x < 3 \rightarrow x^2 < 9 \rightarrow -3 < x < 3 \\ |x-2| > 1 \rightarrow |x| > 2 \rightarrow x > 2 \text{ or } x < -2 \rightarrow D: (-\infty, -2) \cup (2, +\infty) - \{\pm 3\} \\ |x-2| \neq 1 \rightarrow |x| \neq 2 \rightarrow x \neq \pm 2 \end{cases}$$

$$\text{ج) } \text{Zag } \frac{x^2 - 4x + 3}{x^2 - 1} \begin{cases} \frac{(x-3)(x-1)}{x^2 - 1} > 0 \rightarrow \frac{x-3}{x+1} \rightarrow x > 3 \\ 1 - x > 0 \rightarrow x < 1 \\ 1 - x \neq 0 \rightarrow x \neq 1 \end{cases} \rightarrow D: (3, 1) - \{1\}$$

$$\text{د) } \sqrt{x^2 - 11x + 18} + \text{Zag } \sqrt{4x - 2x^2} \rightarrow (x-5)(x-4) \geq 0 \rightarrow \frac{x-5}{x-4} \rightarrow x \leq 4 \text{ or } x \geq 5 \quad \frac{x-5}{x-4} > 0 \rightarrow \frac{(x-5)(x-4)}{x-4} \rightarrow \frac{x-5}{x-4} > 0 \rightarrow x < 4 \text{ or } x > 5$$

$$\Rightarrow x > 0 \text{ or } x \neq 1 \Rightarrow D: (0, 4) \cup (5, +\infty) - \{1\}$$

$$y = \frac{x^2 - x}{x^2 + x} \rightarrow \frac{x(x-1)}{x(x+1)} \rightarrow \begin{array}{c|ccc|c} & -1 & 0 & 1 & \\ \hline x^2 - x & + & + & 0 & - & 0 & + \\ x^2 + x & + & 0 & - & 0 & + & + \\ \hline y & + & - & - & - & + & \end{array}$$

$\Leftarrow$ كافي

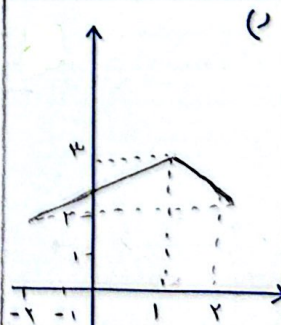
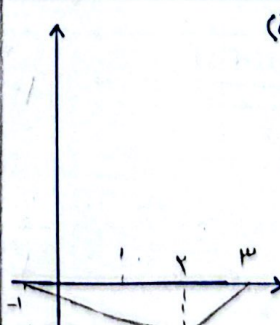
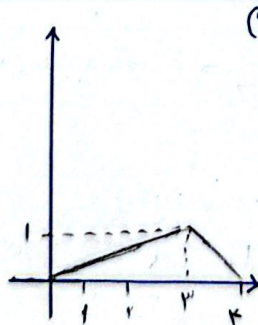
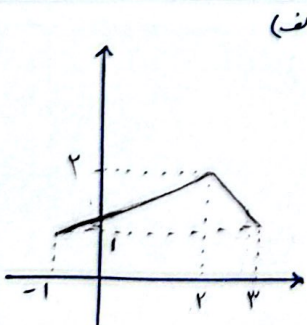
$$\begin{array}{c|ccc|c} & -1 & 0 & 1 & \\ \hline y & + & - & - & + \end{array}$$

$\Leftarrow$ كافي

$$\frac{x - f(x)}{f(x)} > 0 \quad \begin{array}{c} \xrightarrow{-1, 3, \infty} \\ \downarrow \\ \text{Zag } x, -x \end{array}$$

$$\begin{array}{c|ccc|c} & -1 & 0 & 1 & \\ \hline x & - & 0 & + & + \\ -x & + & 0 & - & - \\ \hline y & - & + & - & - \end{array}$$

$$D: (-1, 0] \cup (1, 3]$$



10