

$$2x^2 + y^2 - 4x + 6y + 1 < 0 \rightarrow 2(x^2 - 2x) + (y^2 + 6y) + 1 < 0$$

-1

$$2((x-1)^2 - 1) + ((y+3)^2 - 9) + 1 < 0 \rightarrow 2(x-1)^2 + (y+3)^2 + 1 < 11 \Rightarrow 2(x-1)^2 + (y+3)^2 = 11 - 1 < 11$$

$$2(x-1)^2 + (y+3)^2 = 11 - 1 < 11 \Rightarrow 1 < 11$$

$$x = a \rightarrow a^2 + fa = 2a, a + 2 \Rightarrow a^2 + a - 2 = 0 \rightarrow (a+2)(a-1)$$

-2

$$f(1) = 1 + f = a$$

$$\begin{matrix} -2 & 1 \\ x & \checkmark \end{matrix} \Rightarrow a = 1$$

$$|x+1| > 2 \begin{cases} x > 1 \\ x < -3 \end{cases} \Rightarrow f(x) = \begin{cases} 2x^2 - b: & x > 1 \cup x < -3 \\ a + 2x: & -3 \leq x \leq -1 \end{cases} \Rightarrow x = -3 \rightarrow 11 - b = a - 6 \Rightarrow a = b = 24$$

-3

$$y = \sqrt{6x-a} + \sqrt{b-3x} \begin{cases} 6x \geq a \\ x \geq \frac{a}{6} \end{cases} \begin{cases} b-3x \geq 0 \\ x \leq \frac{b}{3} \end{cases}$$

$$D = \{2\} \Rightarrow \frac{a}{6} = \frac{b}{3} = 2$$

-4

$$\Rightarrow \frac{b}{a} = \frac{6}{12} = \frac{1}{2}$$

$$\text{الف) } y = \sqrt{\frac{x+1}{x-3}} + \sqrt{\frac{6-x}{x^2+2x+5}} \begin{matrix} -1 & 3 \\ 3 & \end{matrix} \rightarrow \frac{-1}{x-3} \rightarrow (-\infty, 3] - \{2\} \text{ ②}$$

-5

$$\frac{-1}{x-3} \rightarrow [-1, +\infty) - \{2\} \text{ ①}$$

$$\text{ب) } y = \sqrt{[x]-4} + \sqrt{2-[x]} \begin{matrix} [x] > 4 \\ 2 > [x] \end{matrix}$$

$$[4, +\infty) \cap (-\infty, 2) \rightarrow D = \emptyset$$

$$\text{الف) } \sqrt{\frac{x^2-x-6}{x^2-13x^2+36}} \rightarrow \frac{(x-3)(x+2)}{(x^2-9)(x^2-4)} \geq 0 \begin{matrix} (x+2)(x-3) & (x-3)(x+2) \end{matrix}$$

$$\frac{-3}{x-3} \frac{-2}{x+2} \frac{2}{-x-2} \frac{3}{x+3}$$

-6

$$D = (-\infty, -3) \cup (2, +\infty) - \{2\}$$

$$\text{ب) } y = \sqrt{\frac{x^2-4x^2-5x+6}{x^2+2x^2-5x-6}} \rightarrow \frac{(x-1)(x-3)(x+2)}{(x+1)(x+3)(x-2)} \geq 0 \begin{matrix} -3 & -2 & -1 & 1 & 2 & 3 \\ + & - & + & - & + & - \end{matrix}$$

$$D = (-\infty, 3) \cup [2, -1) \cup [1, 2) \cup [3, +\infty)$$

الف) $y = \sqrt{-x-2}$

$[x] \geq -2 \rightarrow x \leq -2 \Rightarrow D = (-\infty, -2]$

ب) $y = \frac{5x^2 + 6}{[x]^2 - 2[x] - 3} \rightarrow ([x] - 3)([x] + 1) \neq 0 \quad D = \mathbb{R} - \{[3, 4) \cup [-1, 0)\}$

الف) $\sin x \neq 0 \quad \tan x \neq -1$
 $\cos x \neq 0$

$D = \mathbb{R} - \{k\frac{\pi}{2}, k\pi - \frac{\pi}{6}\}$



ب) $\sin^2 x \leq \frac{1}{4}$

$-\frac{1}{2} < \sin x \leq \frac{1}{2}$

$D = [k\pi - \frac{\pi}{6}, k\pi + \frac{\pi}{6}]$



الف) $1 > \log_{\frac{1}{2}}(x-1)$
 $0 < |x-1|$

$\frac{x-1}{x} > 0$

$x-1 > \frac{1}{x} \Rightarrow x > \frac{x}{x-1}$

$D = [\frac{x}{x-1}, +\infty)$

ب) $\frac{\sqrt{x^2-x}}{1-\log_2 x^2-3} \rightarrow x^2-x \geq 0 \quad x(x-1) \geq 0 \quad \frac{1}{x-1} \rightarrow (-\infty, 0] \cup [1, +\infty)$

$\frac{1-\log_2 x^2-3}{x^2-3x} \rightarrow x^2-3x \geq 0 \quad x(x-3) \geq 0 \quad \frac{1}{x-1} \rightarrow (-\infty, 0) \cup (3, +\infty)$

$\log_2 x^2-3x \neq 1$

$x^2-3x \neq 2$

$x^2-3x-2 \neq 0 \rightarrow (x-4)(x+1) \neq 0 \quad D = (-\infty, 0) \cup (3, +\infty)$

$-\{ -1, 4 \}$

الف) $2^{4x-x^2} \geq 2^3$

$-x^2+4x \geq 3$

$-x^2+4x-3 \geq 0 \rightarrow (x-3)(x-1) \leq 0$

$\frac{1}{x-1} \geq \frac{1}{x-3}$

$D = [1, 3]$

ب) $x = \frac{-4w-5}{2w-3} = \frac{-4w+5}{2w-3} \Rightarrow D = \{x | x = \frac{-4w+5}{2w-3}, w \in \mathbb{W}\}$