

$$x^2 + y^2 - 4x + 4y + k = 0 \begin{cases} x^2 + y^2 + ① \rightarrow (y+2)^2 & ① = 4 \\ x^2 - 4x + ② \rightarrow x^2 - 4x + ② \rightarrow (x-2)^2 & ② = 4 \end{cases}$$

$$k = ① + ② = 4 + 4 = 8$$

$$f(1) = (1)^2 + f(1) = 5$$

$$x+1 \geq x \quad x \geq 1$$

$$x+1 \leq -x \quad x \leq -1$$

$$x(-3)^2 - b = a + x(-3) \rightarrow a + b = 9$$

$$x > a \quad x > a$$

$$b < a \quad b < a$$

$$\frac{b}{a} = \frac{1}{x}$$

$$\frac{x+1}{|x-3|} \geq 0 \quad x = -1 \quad \frac{-1}{1+1} = -\frac{1}{2} \quad (-\infty, -1] \cup (3, +\infty)$$

$$\frac{4-x}{x^2+x+1} \geq 0 \quad x = 4 \quad \frac{4}{1+1} = 2 \quad (-\infty, 4]$$

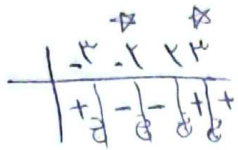
$$① \cap ② = (-\infty, -1] \cup (3, 4]$$

$$[x] - 4 \geq 0 \quad [x] \geq 4 \quad [x] \in (4, +\infty) \quad ①$$

$$x - [x] \geq 0 \quad x \geq [x] \quad (-\infty, 3) \quad ②$$

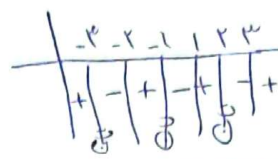
$$① \cap ② = \emptyset$$

$\frac{x^2 - x - 4}{x^2 - 1} \geq 0$
 $(x-1)(x+1) = 0$
 $\begin{cases} x=1 \\ x=-1 \end{cases}$
 $(x^2 - 4)(x^2 - 1) = 0$
 $\begin{cases} x=2 \\ x=-2 \end{cases}$



$\mathbb{R} = (-\infty, -2) \cup (-1, 1) \cup (2, +\infty)$

$\frac{x^2 - x^2 - 13x + 4}{x^2 + 4x^2 - 13x - 4} \geq 0$
 $(x-1)(x^2 - x - 4)$
 $\begin{cases} x=1 \\ x=2 \\ x=-2 \end{cases}$
 $(x+1)(x^2 + x - 4)$
 $\begin{cases} x=-1 \\ x=2 \\ x=-2 \end{cases}$



$(-\infty, -2) \cup [-1, 1] \cup [2, +\infty)$

$[x] = 2 \Rightarrow [x] \geq 2 \Rightarrow x \geq 2 \Rightarrow \mathbb{R} = (-\infty, 2]$

$(x)^2 - 1(x)^2 \neq 0$

$([x] - 1)([x] + 1) \neq 0 \Rightarrow \begin{cases} [x] = 1 \rightarrow 1 < x < 2 \rightarrow [1, 2) \\ [x] = -1 \rightarrow -1 < x < 0 \rightarrow [-1, 0) \end{cases}$
 $\mathbb{R} = [-1, 0) \cup [1, 2)$

$\tan \alpha + 1 \neq \tan \alpha \neq 1$
 $\cos \alpha \neq 0 \quad \sin \alpha \neq 0$

$\mathbb{R} \setminus \left\{ k\pi, \frac{\pi}{2}, k\pi + \frac{\pi}{2}, k\pi \right\}$

$1 - \sin \alpha \geq 0 \Rightarrow 1 \geq \sin \alpha \Rightarrow \frac{1}{2} \leq \sin \alpha \leq \frac{1}{2}$

$\mathbb{R} = \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$

$x^2 - x \geq 0 \quad x(x-1) \geq 0 \quad \begin{matrix} x=0 \\ x=1 \end{matrix}$
 $\frac{1}{+|-|+} \quad (-\infty, 0) \cup [1, +\infty)$
 $x^2 - 3x \geq 0 \quad x(x-3) \geq 0 \quad \begin{matrix} x=0 \\ x=3 \end{matrix}$
 $\frac{1}{+|-|+} \quad (-\infty, 0) \cup [3, +\infty)$
 $1 - \log_{\frac{1}{2}} x \neq 0 \quad \log_{\frac{1}{2}} x \neq 1 \quad x^2 - x \neq 1 \quad (x-1)(x+1) \neq 0$
 $\begin{matrix} x=1 \\ x=-1 \end{matrix}$
 $\mathbb{R} \setminus \{-1, 1\}$
 $\begin{cases} x-1 > 0 \quad x > 1 \quad (1) \\ 1 - \log_{\frac{1}{2}} \frac{x-1}{x} \geq 0 \quad \log_{\frac{1}{2}} \frac{x-1}{x} \leq 1 \\ x-1 \geq \frac{1}{x} \quad x \geq \frac{x}{x-1} \quad (2) \end{cases}$
 $(1) \cap (2) = \left[\frac{x}{x-1}, +\infty \right)$

$\frac{x^2 - x^2}{x^2 - 1} \geq 0 \quad \frac{x^2 - x^2}{x^2} \geq 0 \quad \frac{x^2 - x^2}{x^2 - 1} \geq 0$
 $x^2 - 1 \geq 0 \quad \begin{cases} x=1 \\ x=-1 \end{cases}$
 $\frac{1}{+|-|+}$

$\mathbb{R} = [1, 3]$

$\frac{x_1 + \omega}{x_1 + t} \in \omega \rightarrow x_1 + \omega \in t\omega + t\omega$
 $x_1 - t\omega \in t\omega - \omega \rightarrow x_1(t - 1) \in t\omega - \omega$
 $x_1 \in \frac{t\omega - \omega}{t - 1}$

$\mathbb{R} = \left\{ x \mid x = \frac{t\omega - \omega}{t - 1}, k \in \omega \right\}$