

۱۴۰۵

$$\begin{aligned}
 x^2 + y^2 - 4x + 4y + k &= 0 \\
 (y^2 + 4y + 4) - 4 + 2x^2 - 4x + 1 &= 11 - k \\
 (y+2)^2 - 9 + 2(x-2)^2 - 1 + k &= 0 \\
 \Rightarrow -9 - 1 + k &= 0 \Rightarrow \underline{k=10}
 \end{aligned}$$

$(y+2)^2 + 2(x-2)^2 = 11 - k$
 $k=10$
 مرکز نقطه $(2, -2)$

$$\begin{aligned}
 x^2 + 4x &= 2x + a + 2 \\
 a^2 + a + 2 &= 0 \\
 (a+2)(a-1) &= 0 \\
 \Rightarrow a &= -2 \text{ or } 1 \\
 b &= 1
 \end{aligned}$$

$$f(x) = \begin{cases} x^2 + 4x & x \geq 1 \\ 2x + 2 & x < 1 \end{cases}$$

$x \geq 1 \Rightarrow f(1) = 5$
 $x < 1 \Rightarrow f(1) = 4$
 $\Rightarrow f(1) = 4$

$$|x+1| \geq 2 \Rightarrow x+1 \geq 2 \text{ or } x+1 \leq -2 \Rightarrow x \geq 1 \text{ or } x \leq -3$$

$$f(x) = \begin{cases} 2x^2 - b & x \geq 1 \\ a + 2x & x \leq -3 \end{cases}$$

$-3 \leq x \leq -1$
 $f(-3) \rightarrow 2(-3)^2 - b = a + 2(-3)$
 $18 - b = a - 6 \Rightarrow a - b = -24 \Rightarrow a + b = 24$

$$\begin{aligned}
 4n - a &\geq 0 \\
 512 &\geq a \\
 b - 3n &\geq 0 \\
 b &\geq 9
 \end{aligned}$$

$$\Rightarrow \frac{b}{a} = \frac{9}{12} = \underline{\underline{\frac{3}{4}}}$$

الف) $x+1 \geq 0 \Rightarrow x \geq -1$

$|x-2| \geq 0 \Rightarrow x-2 \geq 0 \text{ or } x-2 \leq 0 \Rightarrow x \geq 2 \text{ or } x \leq 2$
 $x \geq 2 \Rightarrow x \in R - \{2\} \cap [1, +\infty) \Rightarrow [2, +\infty) - \{2\}$
 $x \leq 2 \Rightarrow x \in (-\infty, 2) \cup (2, 4]$

$x \in [1, 4] - \{2\}$

ب) $[x] - 4 \geq 0 \Rightarrow [x] \geq 4 \Rightarrow x \geq 4 \Rightarrow (4, +\infty)$
 $x - [x] \geq 0 \Rightarrow -[x] \geq -2 \Rightarrow [x] \leq 2 \Rightarrow x < 3 \Rightarrow (-\infty, 3)$

$\Rightarrow (-\infty, 3) \cap (4, +\infty) = \emptyset$

الف) $\frac{x^2 - x - 9}{x^2 - 1} \geq 0 \rightarrow x^2 - 1 \neq 0 \rightarrow x \neq \pm 1$
 $x^2 - 1 \neq 0 \rightarrow x \neq \pm 1$
 $x^2 - 1 \neq 0 \rightarrow x \neq \pm 1$

ب) $\frac{x^2 - 2x - 9}{x^2 + 2x + 9} \geq 0$

$(x-1)(x+3)(x-3)$
 $(x+1)(x-2)(x+3)$

$-3 \quad -2 \quad -1 \quad 1 \quad 3$
 $+ \quad - \quad - \quad + \quad +$
 $\rightarrow Df = (-\infty, -3) \cup (-2, 2) \cup (3, +\infty)$

$-3 \quad -2 \quad -1 \quad 1 \quad 3$
 $+ \quad - \quad - \quad + \quad +$
 $\rightarrow Df = (-\infty, -3) \cup (-2, -1) \cup (1, 2) \cup (3, +\infty)$

الف) $[-x] - 2 \geq 0 \quad [-x] \geq 2 \Rightarrow x \leq -2 \rightarrow (-\infty, -2]$

ب) $[2x] - 2[x] - 2 \neq 0$

$Df = (-1, 0) \rightarrow 0$

$[x] \neq -1 \quad x \notin [-1, 1]$

$x \notin [-1, 1]$

$\Rightarrow Df = \mathbb{R} - (-1, 0)$

$1, 0$

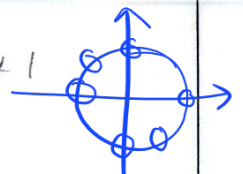
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الف) $\cot = \frac{\cos}{\sin} \rightarrow \sin \neq 0 \rightarrow \mathbb{R} - \{k\pi\}$

$\tan = \frac{\sin}{\cos} \rightarrow \cos \neq 0 \rightarrow \mathbb{R} - \{k\pi + \frac{\pi}{2}\}$

$\tan x - 1 \neq 0 \Rightarrow \tan x \neq 1$

$\hookrightarrow \mathbb{R} - \{k\pi + \frac{\pi}{4}\}$



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ب) $1 - \epsilon \sin^2 x \geq 0 \rightarrow -\epsilon \sin^2 x \geq -1 \quad \epsilon \sin^2 x \leq 1 \rightarrow \sin^2 x \leq \frac{1}{\epsilon} \rightarrow -\frac{1}{\sqrt{\epsilon}} \leq \sin x \leq \frac{1}{\sqrt{\epsilon}}$

$Df = [-\frac{1}{\sqrt{\epsilon}}, \frac{1}{\sqrt{\epsilon}}] \Rightarrow Df = \{k\pi \pm \frac{\pi}{\epsilon}\}$

$-\frac{\pi}{4} \quad \frac{\pi}{4}$

$1, 0$

الف) $1 - \log_{\frac{1}{2}} x \geq 0 \rightarrow x - 1 \geq 0 \rightarrow x \geq 1 \rightarrow (1, +\infty) \rightarrow 1$

$\hookrightarrow \log_{\frac{1}{2}} x \leq 1 \Rightarrow x - 1 \leq \frac{1}{2} \rightarrow x \leq \frac{3}{2} \rightarrow (-\infty, \frac{3}{2}] \rightarrow 2$

$\cap 2 \rightarrow (1, \frac{3}{2}]$

ب) $x^2 - x \geq 0 \rightarrow x(x-1) \geq 0 \rightarrow (-\infty, 0] \cup [1, +\infty)$

$1 - 1 + 1$

$x \neq -1, 1$

$1 - \log_{\frac{1}{2}} x^2 \geq 0 \rightarrow \log_{\frac{1}{2}} x^2 \leq 1 \quad x^2 - 3 \leq \epsilon \rightarrow x^2 \leq 3 + \epsilon \Rightarrow |x| \leq \sqrt{3 + \epsilon} \Rightarrow -\sqrt{3 + \epsilon} \leq x \leq \sqrt{3 + \epsilon}$

$\Rightarrow Df = [-\sqrt{3 + \epsilon}, \sqrt{3 + \epsilon}] \cup [1, +\infty)$

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

$-x^2 + \epsilon x - 1 \leq 0 \rightarrow x^2 - \epsilon x + 1 \geq 0$
 $\hookrightarrow x^2 - \epsilon x + 1 \geq 0$
 $\hookrightarrow x^2 - \epsilon x + 1 \geq 0$

ب) $\frac{x^2 + a}{x^2 + b} \in \mathbb{W} \rightarrow x^2 + a \in \mathbb{W}(x^2 + b) \rightarrow x^2 - x^2 + a \in \mathbb{W} - a$
 $\Rightarrow x^2 - x^2 + a \in \mathbb{W} - a$
 $\Rightarrow x^2 - x^2 + a \in \mathbb{W} - a$

$\Rightarrow Df = \{x \mid x = \frac{\epsilon w - a}{x^2 - x^2}, k \in \mathbb{W}\}$

$1, 0$

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