

$$2x^2 + y^2 - 4x + 4y + k = 0$$

$$(\sqrt{2}x - 2)^2 + (y + 1)^2 = 0$$

$$\hookrightarrow z = \sqrt{2}t + 1$$

$$k = z^2 + t^2 = 4 + 9 = 11 \quad \checkmark$$

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$$x = a \Rightarrow a^2 + 4a = 3a + 2 \rightarrow a^2 + a - 2 = 0$$

$$(a - 2)(a + 1) = 0 \rightarrow a = -2, +1$$

$$a > 0 \rightarrow a = 1 \quad \checkmark$$

$$f(1) = (1)^2 + f(1) = 0 \quad \checkmark$$

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$$|x - 1| > 2 \rightarrow x > 3, x < -1$$

(جواب سولات ۵ و ۶)

$$x = -3 \Rightarrow 18 - b = a - 4$$

$$\hookrightarrow a + b = 22 \quad \checkmark$$

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$$4x - a > 0 \rightarrow 4x > a \rightarrow x > \frac{a}{4} \quad (1)$$

$$b - 3x > 0 \rightarrow 3x < b \rightarrow x < \frac{b}{3} \quad (2)$$

$$(1) \cup (2) \rightarrow \frac{b}{3} > x > \frac{a}{4} \Rightarrow \frac{a}{4}, \frac{b}{3} = 2 \rightarrow a = 12, b = 4$$

$$\frac{b}{a} = \frac{1}{3} \quad \checkmark$$

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$$\text{الف)} \quad \frac{x^2 - x - 4}{x^2 - 13x + 24} > 0 \quad x^2 - x - 4 = 0 \quad x = 3.7, -1.7$$

$$(x - 3.7)(x + 1.7) = 0$$

$$x = t \rightarrow t^2 - 13t + 24 = 0 \rightarrow (t - 8)(t - 9) = 0$$

$$t = 8, 9 \rightarrow x = \pm 2, \pm 3$$

$$x \mid \begin{array}{c} -3 \\ -2 \\ -1 \\ 0 \\ 1 \\ 2 \\ 3 \end{array} \quad x \in (-\infty, -3) \cup (2, 3) \cup (3, +\infty) \quad \checkmark$$

$$\frac{x^2 - 2x^2 - 5x + 4}{x^2 + 2x^2 - 5x - 4} > 0 \quad \frac{-x^2 + 2x^2 - 5x + 4}{x^2 + 2x^2 - 5x - 4} \mid \frac{x+1}{x^2+x-4}$$

$$\frac{-x^2 - 2x^2 - 5x + 4}{x^2 + 2x^2 - 5x - 4} \mid \frac{x+1}{x^2+x-4}$$

$$x^2 - 2x^2 - 5x + 4 = (x - 1)(x - 4)$$

$$x^2 + 2x^2 - 5x - 4 = (x + 1)(x + 4)$$

$$x \mid \begin{array}{c} -3 \\ -2 \\ -1 \\ 0 \\ 1 \\ 2 \\ 3 \end{array} \quad x \in [3, +\infty) \cup [-2, -1) \cup (-\infty, -3) \cup (1, 2) \quad \checkmark$$

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| <p>الف) <math>\frac{x+1}{1-x} &gt; 0 \rightarrow x+1 &gt; 0 \rightarrow x &gt; -1</math> ①</p> <p><math>x-3 \neq 0 \rightarrow x \neq 3</math> ②</p> <p><math>\frac{4-x}{x^2+x+1} &gt; 0 \quad 4-x &gt; 0 \rightarrow x &lt; 4</math> ③</p> <p><math>\hookrightarrow 0 &lt; x &lt; 4 \rightarrow</math> مكافئ ✓</p> <p>① <math>\cup</math> ② <math>\cup</math> ③ <math>\rightarrow x \in [-1, 4] - \{3\}</math></p> | <p>ب) <math>[x] - 4 &gt; 0 \rightarrow [x] &gt; 4</math></p> <p><math>\rightarrow x &gt; 4</math> ①</p> <p><math>2 - [x] &gt; 0 \rightarrow [x] &lt; 2</math></p> <p><math>\rightarrow x &lt; 2</math> ②</p> <p>① <math>\cup</math> ② <math>\rightarrow x \in \emptyset</math> ✓</p>                                                                                                                                                                                                                                                                                                                                                                | <p>٦</p>  |
| <p>الف) <math>[-x] - 2 &gt; 0 \rightarrow [-x] &gt; 2</math></p> <p><math>-x &gt; 2 \rightarrow x &lt; -2</math> ✓</p>                                                                                                                                                                                                                                                                                              | <p>ب) <math>[x] = 1 \rightarrow 1^2 - 4 + 3 \neq 0</math></p> <p><math>(t-3)(t+1) \neq 0 \rightarrow t \neq 3, -1</math></p> <p><math>[x] \neq 3 \rightarrow x \neq [3, 4)</math> ①</p> <p><math>[x] \neq -1 \rightarrow x \neq [-1, 0)</math> ②</p> <p>① <math>\cup</math> ② <math>\rightarrow x \in \mathbb{R} - [3, 4) \cup [-1, 0)</math> ✓</p>                                                                                                                                                                                                                                                                                                 | <p>٧</p>  |
| <p><math>\cot x = \frac{\cos x}{\sin x} \rightarrow \sin x \neq 0</math> (الف)</p> <p><math>\tan x = \frac{\sin x}{\cos x} \rightarrow \cos x \neq 0</math></p> <p><math>\tan x + 1 \neq 0 \rightarrow \tan x \neq -1</math></p> <p><math>x \in \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}, k\pi + \frac{3\pi}{4}\}</math> ✓</p>                                                                                     | <p>ب) <math>1 - f \sin^2 x &gt; 0 \rightarrow f \sin^2 x &lt; 1</math></p> <p><math>\rightarrow \sin^2 x &lt; \frac{1}{f} \rightarrow -\frac{1}{f} &lt; \sin x &lt; \frac{1}{f}</math></p> <p><math>x \in [k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4}]</math> ✓</p>                                                                                                                                                                                                                                                                                                                                                                                 | <p>٨</p>  |
| <p>الف) <math>\log \frac{x-1}{f} \rightarrow x-1 &gt; 0 \rightarrow x &gt; 1</math> ①</p> <p><math>1 - \log \frac{x-1}{f} &gt; 0 \rightarrow \log \frac{x-1}{f} &lt; 1</math></p> <p><math>\rightarrow x-1 &gt; \frac{1}{f} \rightarrow x &gt; \frac{f+1}{f}</math> ②</p> <p>① <math>\cup</math> ② <math>\rightarrow x \in [\frac{f+1}{f}, +\infty)</math> ✓</p>                                                    | <p>ب) <math>x^2 - x &gt; 0 \rightarrow x(x-1) &gt; 0</math></p> <p><math>\frac{x}{1+\frac{1}{f}-\frac{1}{f}} \quad x \in (-\infty, 0] \cup [1, +\infty)</math> ①</p> <p><math>\log \frac{x^2-3x}{f} \quad x^2-3x &gt; 0 \quad \frac{x}{1+\frac{1}{f}-\frac{1}{f}} \quad x \in (-\infty, 0) \cup (3, +\infty)</math> ②</p> <p><math>\log \frac{x^2-3x}{f} \neq 1 \rightarrow x^2-3x \neq f \rightarrow x^2-3x-f \neq 0</math></p> <p><math>\rightarrow x \neq \frac{3 \pm \sqrt{9+4f}}{2}</math> ③   ① <math>\cup</math> ② <math>\cup</math> ③ <math>\rightarrow x \in (-\infty, 0) \cup (3, +\infty) - \{\frac{3 \pm \sqrt{9+4f}}{2}\}</math> ✓</p> | <p>٩</p>  |
| <p>الف) <math>\mu^{\frac{1}{f}x - x^f} - 1 &gt; 0</math></p> <p><math>\mu^{\frac{1}{f}x - x^f} &gt; 1 \rightarrow \log \mu^{\frac{1}{f}x - x^f} &lt; \frac{1}{f}x - x^f</math></p> <p><math>\mu &lt; \frac{1}{f}x - x^f \rightarrow -x^f + \frac{1}{f}x - \mu &gt; 0</math></p> <p><math>\frac{x}{1-\frac{1}{f}+\frac{1}{f}} \quad x \in [1, \mu]</math> ✓</p>                                                      | <p>ب) <math>\frac{\mu x + \omega}{\nu x + \kappa} \in \mathbb{W} \rightarrow x \in -\frac{\kappa \mathbb{W} - \omega}{\nu \mathbb{W} - \mu}</math></p> <p><math>\Rightarrow \{x \mid x = \frac{\omega - \kappa k}{\nu k - \mu}, k \in \mathbb{W}\}</math> ✓</p>                                                                                                                                                                                                                                                                                                                                                                                     | <p>١٠</p> |