

مقطع: یازدهم β سانس ۱۴۰۳:۳

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$$\text{الف) } \sqrt{\frac{x}{x+1} - \frac{x-1}{x}} = f(x) \rightarrow \frac{x-1}{x} - \frac{x}{x-1} = \frac{(x-1)^2 - x^2}{x(x-1)} = \frac{x^2 - 2x + 1 - x^2}{x(x-1)} = \frac{-2x+1}{x(x-1)} \quad (1)$$

$$f(x) = \sqrt{\frac{1-2x}{x(x-1)}} \rightarrow x \neq 0, x \neq 1, x \neq \frac{1}{2} \quad D_f = (-\infty, 0) \cup \left[\frac{1}{2}, 1\right)$$

$$\text{ب) } \frac{1}{x+1} - \frac{2}{x} \Rightarrow \frac{x - 2(x+1)}{x(x+1)} = \frac{-x-2}{x(x+1)} \Rightarrow \frac{-x-2}{x(x+1)} = \frac{-(x+2)}{x(x+1)}$$

$$\frac{2}{x-1} + \frac{1}{x+2} \Rightarrow \frac{2(x+2) + (x-1)}{(x-1)(x+2)} \Rightarrow \frac{3x+3}{(x-1)(x+2)} = \frac{3(x+1)}{(x-1)(x+2)}$$

$$D_f = \mathbb{R} - \left\{-2, -\frac{3}{2}, 0, 1\right\}$$

$$f(x) = \sqrt{\left(\frac{1}{x}\right)^x - 9} \rightarrow \left(\frac{1}{x}\right)^x - 9 > 0 \quad (2)$$

$$\left(\frac{1}{x}\right)^x - 9 > 0 \rightarrow \left(\frac{1}{x}\right)^x > 9 \rightarrow (x-1)^x > 3^2 \rightarrow 3^{-x} > 3^2 \rightarrow x < -2 \quad (7)$$

$$3^2 - \varepsilon^x > 0 \rightarrow 3^2 > \varepsilon^x \rightarrow (3^2)^x > \varepsilon^{2x} \rightarrow 9 > \varepsilon^{2x} \Rightarrow x < \frac{2}{\ln 9} \quad (2)$$

$$\Rightarrow (-\infty, -2] \cup \left[\frac{2}{\ln 9}, +\infty\right) \quad (7)$$

$$\text{ب) } \sqrt{x-1} + \sqrt{y+1} = 3 \rightarrow x-1 > 0 \rightarrow x > 1$$

$$y+1 = 3 - \sqrt{x-1} \rightarrow 3 - \sqrt{x-1} > 0 \rightarrow \sqrt{x-1} \leq 3$$

$$x-1 \leq 3^2 \Rightarrow x \leq 10 \quad (2) \Rightarrow (7) \cap (2) = [1, 10]$$

$$\frac{(x^2 - x - 2)}{\sqrt{x^2 + 1}} \Rightarrow x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0$$

$$\Rightarrow x > 2 \text{ or } x < -1 \Rightarrow f(x) = (-\infty, -1) \cup (2, +\infty)$$

$$x^2 - 1 > 0 \Rightarrow x < -1 \text{ or } x > 1$$

$$y = \sqrt{3+ax-x^2} \quad D_f = [-1, 3] \rightarrow 3+ax-x^2 > 0 \Rightarrow x^2 - ax - 3 < 0$$

$$a+b = \frac{1}{r} + \frac{r}{r} = 1 \rightarrow (a+b=1) \rightarrow (a+b=-1) \rightarrow \frac{x=a+\frac{\sqrt{a^2+12}}{2}}{r} \rightarrow a \leq \frac{1}{r} \leftarrow \frac{a-\sqrt{a^2+12}}{r} \leq -2$$

$$b \leq \frac{a+\sqrt{a^2+12}}{r} \leq \frac{r}{r}$$

$$f(x) = \begin{cases} 3x-2, & x > 1 \\ 2x+3, & x < 1 \end{cases} \rightarrow g(x) = \sqrt{f(x)-x}$$

$$x > 1 \rightarrow f(x) \leq 3x-2$$

$$f(x) - x \leq (3x-2) - x = 2x-2$$

$$2x-2 > 0 \rightarrow x > 1 \rightarrow D_f = [1, +\infty)$$

$$f(x) = 2x+3$$

$$f(x) - x = 2x+3-x = x+3 \rightarrow x+3 > 0 \rightarrow x > -3 \rightarrow -3 < x < 1$$

$$g(x) = [-3, 1) \cup [1, +\infty) = [-3, +\infty)$$

(4)

