

19, 15

کیان جعفری

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

$\frac{0}{+} \frac{1}{-} \frac{1}{+} \Rightarrow D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$ ✓

ب) $f(x) = \frac{\frac{1}{x+1} - \frac{1}{x}}{\frac{x}{x-1} + \frac{1}{x+2}} \Rightarrow x \neq \{-1, 0, 1, -2\} \rightarrow D_f = \mathbb{R} - \{-1, 0, 1, -2\}$
 $\frac{2x+7+x-1}{(x-1)(x+2)} \neq 0 \Rightarrow 3x+6 \neq 0 \Rightarrow x \neq \frac{-6}{3}$ ✓

② الف) $f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^2 - 9\right)(x-2)}$ $\frac{-2}{+} \frac{1, \omega}{-} \Rightarrow D_f = (-\infty, -1] \cup [\frac{1}{9}, +\infty)$
 ب) 0 ③

③ $x^2 - x - 2 > 0 \Rightarrow \frac{-1}{+} \frac{2}{-} \Rightarrow (-\infty, -1) \cup (2, +\infty)$

~~نادر~~ $x^2 - 1 \geq 0 \Rightarrow \frac{-1}{+} \frac{1}{-} \Rightarrow (-\infty, -1] \cup [1, +\infty)$

$\sqrt{x^2-1} + 1 \neq 0 \Rightarrow x^2-1 \neq -1 \Rightarrow x^2 \neq 0 \Rightarrow x \neq \pm \sqrt{0}$

$D_f = (-\infty, -1) \cup (2, +\infty) - \{ \pm \sqrt{0} \}$ ✓

④ $x + a^b + b^x = 0 \Rightarrow a^b + b^x = -x$, $x + -2a - x = 0$
 $-2a = 1 \Rightarrow a = \frac{-1}{2}$ ⑤

~~نادر~~

$\Rightarrow \frac{-b}{x} - b^x = -x \Rightarrow -b - x b^x = -x \Rightarrow x b^x + b + x = 0$

~~نادر~~ $f(x) = \sqrt{x - \frac{1}{x} - x^2}$ $\frac{-2}{+} \frac{1}{-} \Rightarrow \frac{1}{x} = b$
 $a+b=1$

$$f(x) = \begin{cases} x^{n-1} & x \geq 1 \\ x^{n+1} & x < 1 \end{cases} \xrightarrow{g(x)} \sqrt{x^{n-1}} \Rightarrow x \geq 1 \Rightarrow \boxed{x \geq 1}$$

$$\xrightarrow{g(x)} \sqrt{x^{n+1}} \Rightarrow x + 1 \geq 0 = x \geq -1$$

$$\Rightarrow -1 \leq x < 1 \Rightarrow D_f = [-1, +\infty) \checkmark$$

$$f(a+1)(v) = x_a - 1 + a \Rightarrow 1x_a + 1 = x_a - 1$$

$$\Rightarrow 1 \cdot a = -1 \Rightarrow a = -1 \checkmark$$

$$\sqrt{x} - \sqrt{x} = \frac{\sqrt{x} - 1}{\sqrt{x}} \quad \sqrt{x+1} = \frac{\sqrt{x+1}}{\sqrt{x}}$$

$$\Rightarrow \frac{\sqrt{x} - 1}{\sqrt{x}} + \frac{\sqrt{x+1}}{\sqrt{x}} = \frac{\sqrt{x} - 1 + \sqrt{x+1}}{\sqrt{x}}$$

$$\Rightarrow \frac{\sqrt{x} - 1 + \sqrt{x+1}}{\sqrt{x}} = \frac{\sqrt{x} - 1 + \sqrt{x+1}}{\sqrt{x}}$$

$$\begin{cases} f(x) - f(-x) = x^2 - x \\ f(-x) - f(x) = x^2 + x \end{cases} \Rightarrow \begin{cases} f(x) - f(-x) = x^2 - x \\ f(-x) - f(x) = x^2 + x \end{cases}$$

$$-2f(x) = x^2 + x$$

$$f(x) = -\frac{x^2}{2} - \frac{x}{2} \checkmark$$

$$f\left(\frac{0}{m}\right) = m - 1 \Rightarrow f(0) = m - 1$$

$$f(0) = \frac{1}{m} + \frac{m}{m} + \frac{m-1}{m} \Rightarrow \frac{1}{m} + 1 = m - 1$$

$$m = 1 \Rightarrow m = 1$$

$$1 \cdot \frac{1}{1} - 1 = 1/1 = f(0) \Rightarrow f(0) = 1/1 \checkmark$$

$$\frac{a}{a+b} + \frac{1}{a+b} = \frac{a^{n-1} - 1}{a+b}$$

$$\frac{(a+b)^n + 1}{a+b} = a^{n-1} + b^{n-1} + \dots + 1$$

$$a=1, b=0$$

$$\begin{aligned}
 \textcircled{10} \quad a n + b + \frac{a}{n} + b &= \frac{a n^2 + 1 a n + a}{n} \quad \textcircled{11} \\
 \frac{a n^2 + b n + a + b n}{n} &= \frac{a n^2 + 1 b n + a}{n} \Rightarrow \begin{aligned} a &= \textcircled{10} \\ b &= \textcircled{9} \end{aligned}
 \end{aligned}$$

$$f(x) = x - 7 \Rightarrow -5 - 7 = \textcircled{-12} \checkmark$$