نام و نام خانوادگی: آیلین عقیلی   تکلیف: ۵   کلاس: یازدهم تجربی

$f(x) = (2^{-1})^{x-2} - 1 = 2^{2-x} - 1 \rightarrow f(x) = 2^{2-x} - 1$

$y = \sqrt{x^3 f(x+1)} \rightsquigarrow f(x+1) = 2^{2-(x+1)} - 1 = 2^{1-x} - 1 \rightarrow y = \sqrt{x^3 (2^{1-x} - 1)} \rightarrow$ ۱

$x^3 (2^{1-x} - 1) \geq 0$

ریشه: (0) (1)

$\boxed{D_f : [0, 1]} \leftarrow$ $\begin{array}{ccccc} & 0 & & 1 & \\ - & | & + & | & - \end{array}$

$f(x) = \sqrt{x + |x+2|}$

$f(-x) = \sqrt{-x + |2-x|} \rightsquigarrow |2-x| - x \geq 0 \quad 2 - x \geq x \rightarrow 2x \leq 2 \rightarrow x \leq 1$

$|2-x| \geq x \quad \cup \quad 2 - x \leq -x \ \times$

$\Rightarrow \boxed{D_f : (-\infty, 1]}$ ۲

$y = \sqrt{\dfrac{x-1}{f(x)}} \rightarrow \dfrac{x-1}{f(x)} \geq 0$ $\quad (1)$; $\quad (-4)\ (2)\ (3)$

$\rightarrow \begin{array}{ccccccccc} & -4 & & 1 & & 2 & & 3 & \\ - & | & + & | & - & | & + & | & \times \end{array}$

$\boxed{D_f : (-4, 1] \cup (2, 3)}$ ۳

$y_1 = \dfrac{1}{9x^4 - 7x^2 - 4x - 3} \rightsquigarrow 9x^4 - 7x^2 - 4x - 3 = 9x^4 - 6x^2 - x^2 - 4x - 4 + 1$

$= 9x^4 - 6x^2 + 1 - (x^2 + 4x + 4)$

$= (3x^2 - 1)^2 - (x+2)^2 \neq 0 \rightarrow (3x^2 - 1)^2 \neq (x+2)^2$

$3x^2 - 1 \neq -x - 2 \qquad 3x^2 - 1 \neq x + 2$

$3x^2 + x + 1 \neq 0 \qquad 3x^2 - x - 3 \neq 0 : D_{y_1}$

$(+)$ همواره $\Delta < 0$ ✓

$y_2 = \dfrac{1}{3x^2 + ax + b} \rightarrow D_{y_2} : 3x^2 + ax + b \neq 0$ ۴

$D_{y_1} = D_{y_2} \rightsquigarrow 3x^2 + ax + b = 3x^2 - x - 3$

$a = -1$

$b = -3 \Rightarrow \sqrt{-(a+b)} = \sqrt{4} = 2$

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

$x^3 + x - \dfrac{64}{x^3} - \dfrac{4}{x} \geq 0$

$\underbrace{x^3 - \dfrac{64}{x^3}} + x - \dfrac{4}{x}$

$y = \sqrt{\underbrace{f(x)}_{x^3+x} - \underbrace{f\left(\dfrac{4}{x}\right)}_{\left(\frac{4}{x}\right)^3 + \frac{4}{x}}} = \sqrt{x^3 + x - \dfrac{64}{x^3} - \dfrac{4}{x}}$

$\left(x - \dfrac{4}{x}\right)\left(x^2 + 4 + \dfrac{16}{x^2}\right) + \left(x - \dfrac{4}{x}\right) =$ ۵

$\left(x - \dfrac{4}{x}\right)\left(x^2 + 5 + \dfrac{16}{x^2}\right) \geq 0$

$x - \dfrac{4}{x} \geq 0 \ ، \ \dfrac{x^2 - 4}{x} \geq 0$

$x^2 = t : \ t + \dfrac{16}{t} + 5 \xrightarrow{\times t} t^2 + 5t + 16$

$(+)$ همواره $\Delta < 0$

$\begin{array}{ccccccc} & -2 & & 0 & & 2 & \\ - & | & + & | & - & | & + \end{array} \quad \boxed{D_f : [-2, 0) \cup [2, +\infty)}$

$f(x^3+x) = 2x^2 - 1 \rightarrow f(2): \; x^3+x=2, \; x^3+x-2=0$

$x^3+x-2 \,|\, x-1 \quad x^2+x+2 \;=\; (x-1)(x^2+x+2) \quad \text{ریشه ندارد} \quad x=1$

$\rightarrow f(2) = 2(1)^2 - 1 \quad f(2)=1$ ۶

$x=2$

$f(10) = 2(2)^2 - 1 = 7 \rightarrow f(10) = 7$

$f(2) + f(10) = 1 + 7 = 8$

$f(x) = x^3 - 6x^2 + 12x - 8 + 8 = (x-2)^3 + 8$

$g(x) = x^3 + 9x^2 + 27x + 27 - 27 = (x+3)^3 - 27 \quad \rightarrow \quad \dfrac{g(\sqrt[3]{7}-3)}{f(\sqrt[3]{2}+2)} = \dfrac{-20}{10} = -2$ ۷

$\Rightarrow g(\sqrt[3]{7}-3) = (\sqrt[3]{7}-3+3)^3 - 27 = -20$

$\Rightarrow f(\sqrt[3]{2}+2) = (\sqrt[3]{2}+2-2)^3 + 8 = 10$

$f(x) = \sqrt{x + 4\sqrt{x-4} + 4 - 4} = \sqrt{(\sqrt{x-4}+2)^2} = |\sqrt{x-4}+2|$ $\quad \dfrac{a+b}{c} = \dfrac{2}{-4} = -\dfrac{1}{2}$

$g(x) = \sqrt{x - 4\sqrt{x-4} + 4 - 4} = \sqrt{(\sqrt{x-4}-2)^2} = |\sqrt{x-4}-2|$

$f(x) + g(x) = |\sqrt{x-4}+2| + |\sqrt{x-4}-2|$ ۸

$4 \le x \le 8: \; \sqrt{x-4}+2+2-\sqrt{x-4} = 4$ ثابت

$x \geq 8: \; \sqrt{x-4}+2+\sqrt{x-4}-2 = 2\sqrt{x-4}$ $\quad a+b\sqrt{x+c} \quad \begin{cases} a=0 \\ b=2 \\ c=-4 \end{cases}$

$f(x) = \dfrac{x+2}{x^2-4x+3} = \dfrac{x+2}{(x-1)(x-3)} \rightarrow D_f : \mathbb{R} - \{1,3\}$

$\Rightarrow D(f \cap g) = \{2, 0\}$

$g(x) = \{(2,1)(1,0)(3,5)(0,4)\} \rightarrow D_g : \{2,1,3,0\}$ ۹

$\dfrac{g}{f} : \left(2, \dfrac{1}{-4}\right)\left(0, \dfrac{4}{\frac{2}{3}}\right) = \{(2, -\tfrac{1}{4}), (0, 6)\}$

$f(x) = \{(1,2)(3,-1)(4,2)(-1,6)\}$

$\rightarrow D(f \cap g) = \{1, 3, -1\}$

$g(x) = \{(-2,3)(1,-1),(3,2)(-1,0)\}$ ۱۰

الف) $f(2x) = \{(\tfrac{1}{2}, 2)(\tfrac{3}{2}, -1)(2,2)(\tfrac{-1}{2}, 6)\}$
$\quad 2x=1 \quad 2x=3 \quad 2x=4 \quad 2x=-1$

ج) $2g^2(x) + 1$:
$\{(-2,19)(1,3)(3,9)(-1,1)\}$
$\quad 2(3)^2+1 \quad 2(-1)^2+1 \quad 2(0)^2+1 \quad 2(2)^2+1$

ب) $f(x^2) = \{(-1,2)(1,2)(\sqrt{3},-1)(-\sqrt{3},-1)\}$
$\quad x^2=1 \quad x^2=3$
$\quad x^2=-1$ غ ق ق $\quad x^2=4 \rightarrow (2,2)(-2,2)$

د) $\dfrac{2f}{g}$: $= \{(1,-4)(3,-1)\}$
$\left(1, \tfrac{4}{-1}\right)\left(3, \tfrac{-2}{2}\right)\cancel{\left(-1, \tfrac{12}{0}\right)}$