نام و نام خانوادگی .... پاسخنامه تشریحی تکلیف شماره .... کلاس ....

$f(x+1) = \frac{1}{2}^{(x+1)-2} - 1 = \frac{1}{2}^{x-1} - 1$ $x^2 f(x+1) \geq 0 \to x^2 (\frac{1}{2}^{x-1} - 1) \geq 0$ $\frac{1}{2}^{x-1} - 1 \geq 0$ $\frac{1}{2}^{x-1} = 1 \to x - 1 = 0 \to x = 1$ $0 \quad 1$: $- \; + \; + \; -$ $D_g = [0, 1]$	۱
$f(-x) = \sqrt{(-x) + \|-x+2\|}$ $\|a\| = \|-a\| \to \|-x+2\| = \|-(x-2)\| \to \|x-2\|$ $f(-x) = \sqrt{(-x) + \|x-2\|} \to -x + \|x-2\| \geq 0$ $x \geq 2$: $-x + x - 2 \geq 0 \to -2 \geq 0$ ✗ $x \leq 2$: $-x - x + 2 \geq 0$ $-2x \geq -2$ $x \leq 1$ ✓ $D_{f(-x)} = (-\infty, 1]$	۲
$\frac{x-1}{f(x)} \geq 0$: $\frac{+}{+} \to (2, 3)$ 1; $\frac{0}{-,+} \to \boxed{[1]}$ 2; $\frac{-}{-} \to (-4, 1)$ 3 $1 \cup 2 \cup 3 = (-4, 1] \cup (2, 3)$	۳
$\frac{1}{9x^4 - 7x^2 - 4x - 3} = \frac{1}{3x^2 + ax + b}$ $9x^4 - 7x^2 - 4x - 3 = (3x^2 + x + 1)(3x^2 - x - 3)$ $\Delta_1 = b^2 - 4ac = 1 - 12 = -11$ ✗ $\Delta_2 = 1 + 24 = 25$ $\frac{1 \pm \sqrt{25}}{6} = \frac{-a \pm \sqrt{a^2 - 12b}}{6} \Rightarrow 1 \pm \sqrt{25} = -a \pm \sqrt{a^2 - 12b}$: $a = -1$ $a^2 - 12b = 25$ $1 - 12b = 25$ $-12b = 24$ $b = -2$ $\sqrt{-(-1 + -2)} = \sqrt{3}$	۴
$f(x) - f(\frac{4}{x}) \geq 0$ $x^3 + x - (\frac{4}{x})^3 + \frac{4}{x} \geq 0 \to \frac{x^6 + x^4 - 64 - 4x^2}{x^3} \geq 0$ $(x^6 - 64) + (x^4 - 4x^2) \to (x^3 - 8)(x^3 + 8) + x^2(x^2 - 4) = (x-2)(x^2 + 2x + 4)(x+2)(x^2 - 2x + 4) + x^2(x^2 - 4)$ $\frac{(x^2 - 4)(x^4 + 5x^2 + 16)}{x^3} \to \frac{(x^2 - 4)}{x^3} \geq 0$. $-2 \quad 0 \quad 2$: $- \; + \; - \; +$ $\to [-2, 0) \cup [2, \infty)$	۵

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$x^3+x=10 \to x(x^2+1)=10 \to x=2$ $x^3+x=2 \to x(x^2+1)=2 \to x=1$ $2\times1^2-1+2\times2^2-1=(2-1)+(8-1)\to 7$	۶
$x^3-6x^2+12x=(x-2)^3+8 \qquad x^3+9x^2+27x=(x+3)^3-27$ $f(\sqrt[3]{2}+2)=((\sqrt[3]{2}+2)-2)^3+8=(\sqrt[3]{2})^3+8=2+8=10$ $g(\sqrt[3]{7}-3)=((\sqrt[3]{7}-3)+3)^3-27 \to (\sqrt[3]{7})^3-27=7-27=-20$ $\dfrac{g(\sqrt[3]{7}-3)}{f(\sqrt[3]{2}+2)}=\dfrac{-20}{10}=-2$	۷
$x=x-4+4 \to f(x)=\sqrt{(x-4)+4+4\sqrt{x-4}} \qquad \sqrt{x-4}=u$ $f(x)=\sqrt{u^2+4+4u}=\sqrt{(u+2)^2} \Rightarrow u+2=\sqrt{x-4}+2$ $g(x)=\sqrt{(x-4)+4-4\sqrt{x-4}}=\sqrt{u^2-4u+4}=\sqrt{(u-2)^2}=\lvert\sqrt{x-4}-2\rvert$ $g(x)\begin{cases}4\le x<8 \to 2-\sqrt{x-4} \to \sqrt{x-4}+2+2-\sqrt{x-4}=4=a+b\sqrt{x+c}\ \begin{cases}b=0\\ \text{[illegible]}\\ a=4\end{cases} \times \\ x\ge 8 \to \sqrt{x-4}-2 \to \sqrt{x-4}+2+\sqrt{x-4}-2=2\sqrt{x-4}=a+b\sqrt{x+c}\ \begin{cases}a=0\ \checkmark\\ b=2\\ c=-4\end{cases}\end{cases}$ $\dfrac{a+b}{c}=\dfrac{0+2}{-4}$ $-\dfrac{2}{4}=-\dfrac{1}{2}$	۸
$x^2-4x+3=(x-1)(x-3) \Rightarrow f_1 , f_3=\varnothing$ $f_{(2)}=\dfrac{2+2}{2^2-4(2)+3}=-4 \qquad \dfrac{g_{(2)}}{f_{(2)}}=\dfrac{1}{-4} \qquad f_0=\dfrac{0+2}{0+4(0)+3}=\dfrac{2}{3} \qquad \dfrac{g_0}{f_0}=\dfrac{4}{\frac{2}{3}}=6$ $\dfrac{g}{f}=\{(2,-\frac{1}{4}),(0,6)\}$	۹
الف) $\{(\frac{1}{2},2),(\frac{3}{2},1),(2,3),(-\frac{1}{3},6)\}$ ب) $\{(1,2),(-1,2),(\sqrt{3},-1),(-\sqrt{3},-1),(2,2),(-2,2)\}$ ج) $\{(-2,19),(1,3),(4,9),(-1,1)\}$ د) $\{(1,-4),(3,-1)\}$	۱۰

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