۶

$f(x^3+x) = 2x^2-1 \qquad f(2)+f(10)=? \longrightarrow 1+7 = (8)$

$\text{if } x=1 \rightarrow (x^3+x) = 1+1 = (2)$

$\rightarrow f(1+1) = 2(1)^2-1 = (1)$

$\text{if } x=2 \quad (x^3+x) = 8+2 = (10) \Longrightarrow f(2^3+2) = 2(2)^2-1 = 8-1 = (7)$

۷

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

$g(x) = (x+3)^3-27$

$$\Rightarrow \frac{g(\sqrt[3]{7}-3)}{f(\sqrt[3]{2}+2)} = \frac{(\sqrt[3]{7}-3+3)^3-27}{(\sqrt[3]{2}-2+2)^3+8} = \frac{(\sqrt[3]{7})^3-27}{(\sqrt[3]{2})^3+8} = \frac{7-27}{2+8} = \frac{-20}{10} \Rightarrow (-2)$$

۸

$f(x) = \sqrt{x+t} \qquad t = 4\sqrt{x-4} \qquad 16(x-4)$

$g(x) = \sqrt{x-t}$

$\frac{a+b}{c} = \frac{10}{12} = \frac{5}{6}$

$\text{if } x \geq 4 \rightarrow \sqrt{x+t}+\sqrt{x-t} = a+b\sqrt{x+c}$

$(f(x)+g(x))^2 \rightarrow x+t+x-t+2\sqrt{x^2-t^2} \rightarrow 2x+2\sqrt{x^2-16x+64} \rightarrow 2x+2\sqrt{(x-8)^2}$

$\text{if } x=4 = 8+2\sqrt{16} \Rightarrow a+b\sqrt{x+c} \quad a=8 \quad b=2 \quad 16=4+c \Rightarrow c=12$

۹

$f(x) = \frac{x+2}{x^2-4x+3}$; $(x-3)(x-1)$ $\qquad g(x) = \{(2,1),(1,5),(3,5),(0,6)\} \qquad \frac{g}{f} = ?$

$\frac{g}{f} = \{(2, \frac{-1}{4}), (1, \frac{\cancel{5}}{0}), (3, \frac{45}{0}), (0,6)\} \Rightarrow \{(2, -\frac{1}{4}), (0, 9)\}$

$f(x) \neq 0$ [illegible]

۱۰

الف) $f(2x) \rightarrow \{(1,4),(3,-2),(4,4),(-1,12)\} \rightarrow \{(\frac{1}{2}, 2),(\frac{3}{2}, -1),(2,2),(-\frac{1}{2}, 12)\}$

ب) $f(x^2) \rightarrow \{(1,4),(3,1),(4,4),(-1,36)\}$

ج) $2g^2(x)+1 \rightarrow \{(-2,19),(1,3),(3,9),(-1,7)\}$

د) $\frac{2f}{g} \longrightarrow \{(1,-4),(3,-1),(-1,\frac{12}{0})\} \Rightarrow \{(1,-4),(3,-1)\}$

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۱

$f(x) = \left(\frac{1}{2}\right)^{x-2} - 1$

$x^2 f(x+1) \geq 0$

$x^2 \to Dx \to [0, +\infty)$ (1)

$f(x+1) \geq 0 \to \left(\frac{1}{2}\right)^{x+1-2} - 1 \geq 0 \quad \left(\frac{1}{2}\right)^{x-1} \geq 1 \Rightarrow x-1 \leq 0 \Rightarrow x \leq 1$ (2)

(1) ∩ (2) = $[0, 1]$

۲

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

$-x - x - 2 \geq 0 \to -2x - 2 \geq 0 \quad -2x \geq 2 \to x \leq -1$

$-x + x + 2 \geq 0 \to 2 \geq 0$ همیشه $\quad \to Df = (-\infty, +1]$

۳

$y = \sqrt{\frac{x-1}{f(x)}} \quad \frac{x-1}{f(x)} \geq 0$

$\Rightarrow (-2, 2) \cup [-4, 0]$

طبق شکل

۴

$9x^4 - 7x^3 - 4x - 2 = 2x^3 + ax + b$

$9x^4 - 7x^3 - (4+a)x - 2 - b = 0 \to \Delta = 0$

$\frac{(9x^2 - 2)(x^2 + 5x + 4)}{9x^2}$ صورت +

$Df = [-2, 1) \cup [2, +\infty)$

۵

$y = \sqrt{f(x) - f\left(\frac{4}{x}\right)}$ $\quad \frac{(9x^2 - 2)(x^2 + 5x + 4)}{9x^2} \geq 0$ $\quad f(x) = x^3 + x$

$Df = [-2, 1) \cup [2, +\infty)$

$f(x) - f\left(\frac{4}{x}\right) \geq 0$

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

	-2		0		2	
	$-$	$+$	∄	$-$	۰	$+$

ب۱۰)
$$\begin{cases} x^2=1 \to x=\pm 1 \\ x^2=3 \to x=\pm\sqrt{3} \\ x^2=4 \to x=\pm 2 \\ x^2=-1 \to \times \end{cases} \to \{(\pm 1,3)(\pm\sqrt{3},-1)(\pm 2,3)\}$$