نام و نام خانوادگی ....حسن حاجی حسینی.... پاسخنامه تشریحی تکلیف شماره ..۵.... کلاس ....B..............

۱	$f(x) = \left(\frac{1}{2}\right)^{x-2} - 1$ $D_f \to y = \sqrt{x^2 f(x+1)}$ $\quad f(x+1) = \left(\frac{1}{2}\right)^{(x+1)-2} - 1 = \frac{1}{2}^{x-1} - 1 = \frac{1}{2}^{x} \times 2 - 1$ $y = \sqrt{x^2 \times \frac{1}{2}^{x} \times 2 - 1}$ $\quad f(x) > 0 \overset{\text{فقط}}{\Rightarrow} x^2 \geq 0 \Rightarrow x \geq 0 \Rightarrow D_f = [0, +\infty)$
۲	$f(x) = \sqrt{x + \lvert x+2 \rvert} \xrightarrow{f(-x)} \sqrt{-x + \lvert 2-x \rvert} \longrightarrow x > 2 \Rightarrow \sqrt{-x + x - 2} = \sqrt{2}$ $x \leq 2 \Rightarrow \sqrt{-x + 2 - x} = \sqrt{-2x + 2}$ $-2x + 2 \geq 0 \Rightarrow 2 \geq 2x \Rightarrow 1 \geq x \Rightarrow D_f = (-\infty, 1]$
۳	$\cancel{-\infty}\ \ -4 \quad 1 \quad 2 \quad 3$ $\sqrt{\cancel{-}\ + \ - \ + \ -} \Rightarrow D_f = (-4, 1] \cup (2, 3)$
۴	$\dfrac{1}{9x^4 - 7x^2 - 4x - 3} \Rightarrow \overset{\div}{=} 9x^4 - (7x^2 + 4x + 3) \Rightarrow$ رشد $\Delta = 16 - 147 \Rightarrow \Delta < 0$ $3x^2 - x - 3 = 3x^2 + ax + b \Rightarrow a = -1, b = -3 \Rightarrow \sqrt{-(-4)} = 2$
۵	~~$f(x) - f\left(\frac{4}{x}\right) \geq 0 \Rightarrow x^2 + x \geq \frac{4}{x^2 + x} \Rightarrow (x^2 + x)^2 \geq 4 \Rightarrow \sqrt{(x^2+x)^2} \geq \sqrt{4}$~~ ~~$\lvert x^2 + x \rvert \geq 2 \Rightarrow x^2 + x \geq 2, \quad x^2 + x \leq -2 \Rightarrow x^2 + x + 2 \leq 0 \Rightarrow [-2, +\infty)$~~ ~~$(-\infty, -1]$~~ ~~$\Rightarrow x^2 + x - 2 \geq 0 \Rightarrow [1, +\infty)$~~ $D_f = [1, +\infty)$ $\quad x^2 + x \geq \frac{64}{x^2} + \frac{4}{x} \Rightarrow \left(x^2 - \frac{64}{x^2}\right) + \left(x - \frac{4}{x}\right) \geq 0 \Rightarrow D_f = [-2, 0) \cup [2, +\infty)$

۶

$x^3 + x = 10 \Rightarrow x = 2 \Rightarrow 2(2)^2 - 1 = 7 = f(10)$

$x^3 + x = 2 \Rightarrow x = 1 \Rightarrow 2(1)^2 - 1 = 1 = f(2)$

$1 + 7 = 8$

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

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

$\frac{-20}{10} = -2$

۸

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

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

$\sqrt{x-4} + 2 + |\sqrt{x-4} - 2| \Rightarrow \sqrt{x-4} - 2 + \sqrt{x-4} + 2 = 2\sqrt{x-4}$

$a = 0 \quad b = 2 \quad c = -4 \quad \frac{0+2}{-4} = \boxed{-\frac{1}{2}}$

۹

$f(x) = \frac{x^2 + 2}{3(x-3)(x-1)} \Rightarrow D_f = \mathbb{R} - \{3, 1\}$

$g(x) \cap f(x) = D_g \cap D_f = (2, 0) \Rightarrow g(x) \cap f(x) = \{(2, -\frac{1}{4}), (0, \frac{2}{3})\}$

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الف) $\{(\frac{1}{2}, 2), (\frac{3}{2}, -\frac{1}{4}), (2, 2), (-\frac{1}{2}, 6)\}$

ب) $\{(1, 2), (-1, 2), (-\sqrt{3}, -1), (\sqrt{3}, -1), (2, 2), (-2, 2)\}$

ج) $\{(-2, 19), (1, 3), (3, 9), (-1, 1)\}$

د) $\{(1, -4), (3, -1)\}$