نام و نام خانوادگی ....وزیر شیرانی.......... پاسخنامه تشریحی تکلیف شماره ۵...... کلاس یازدهم ریاضی...........

**۱**

$f(x) = \left(\frac{1}{2}\right)^{x-2} - 1 \qquad y = \sqrt{x^3 \times f(x+1)}$

$f(x+1) = \left(\frac{1}{2}\right)^{x-1} - 1 \longrightarrow y = \sqrt{\underbrace{x^3}_{0} \times \underbrace{\left(\frac{1}{2}\right)^{x+1} - 1}_{\text{ریشه } 1}} \longrightarrow$

| | $0$ | | $1$ | |
|---|---|---|---|---|
| $-$ | $0$ | $+$ | $0$ | $-$ |

$\longrightarrow D_f = [0 \quad 1]$

**۲**

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

$x \geq 2 \longrightarrow f(x) = \sqrt{-2} \longrightarrow \times$ ناممکن

$x \leq 2 \longrightarrow \sqrt{-2x+2} \longrightarrow -2x+2 \geq 0 \longrightarrow -2x \geq -2 \longrightarrow x \leq 1$

$D_f = (-\infty \quad 1]$

**۳**

$y = \sqrt{\frac{x-1}{f(x)}}$ → $x-1$: ریشه ۱ ، $f(x)$: ریشه ۲ و ۴−

| | $-4$ | | $1$ | | $+2$ | | ۳ |
|---|---|---|---|---|---|---|---|
| $-$ | ت | $+$ | $0$ | $-$ | ت | $+$ | |

$\longrightarrow D_f = (-4 \quad 1] \cup (2 \quad 3]$

**۴**

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

$\longrightarrow y_1 = \frac{1}{3x^2(3x^2+x+1) - x(3x^2+x+1) - 3(3x^2+x+1)} \Rightarrow \frac{1}{\underbrace{(3x^2+x+1)}_{\text{ریشه ندارد}}(3x^2-x-3)}$

$\frac{1}{3x^2-x-3} \overset{\text{معادل}}{=} \frac{1}{3x^2+ax+b} \longrightarrow a = -1,\ b = -3 \longrightarrow \sqrt{4} = 2$

**۵**

$f(x) = x^3 + x \qquad y = \sqrt{f(x) - f\left(\frac{4}{x}\right)}$

$\longrightarrow y = \sqrt{x^3 + x - \frac{64}{x^3} - \frac{4}{x}} = \sqrt{\frac{x^6 + x^4 - 4x^2 - 64}{x^3}} = \sqrt{\frac{\underset{\text{ریشه } 2}{(x-2)}\underset{\text{ریشه } -2}{(x+2)}\underset{\text{ریشه ندارد}}{(x^4+5x^2+16)}}{x^3}}$

| | $2$ | | $0$ | | $-2$ | |
|---|---|---|---|---|---|---|
| $-$ | $0$ | $+$ | ت | $-$ | $0$ | $+$ |

$\longrightarrow D_f = [2 \quad 0) \cup [-2 \quad +\infty)$

**6**

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

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

$x^3+x=10 \longrightarrow x=2 \longrightarrow \underline{f(10)=7}$

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

**7**

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

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

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

$g(x)=x^3+9x^2+27x$

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

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

$\longrightarrow \dfrac{g(\sqrt[3]{7}-3)}{f(\sqrt[3]{2}+2)}=\dfrac{-20}{10}=-2$

**8**

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

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

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

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

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

$g(x)=|\sqrt{x-4}-2| \xrightarrow{x\geq 8} \sqrt{x-4}-2$

$\longrightarrow f(x)+g(x)=\sqrt{x-4}+2+\sqrt{x-4}-2 = 2\sqrt{x-4} \longrightarrow \dfrac{a+b}{c}=\dfrac{2}{-4}=-\dfrac{1}{2}$

**9**

$f(x)=\dfrac{x+3}{x^2-4x+3}$

$(x-3)(x-1) \longrightarrow$

$g(x)=\{(2,1),\cancel{(1,0)},\cancel{(3,5)},(0,4)\}$

$\dfrac{g}{f}(x)=\left\{\left(2,-\dfrac{1}{4}\right),(0,4)\right\}$

**10**

$f(x)=\{(1,2),(3,-1),(4,2),(-1,4)\}$ | $g(x)=\{(-2,3),(1,-1),(3,2),(-1,0)\}$

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

ب) $f(x^2)=\{(1,2),(-1,2),(\sqrt{3},-1),(-\sqrt{3},-1),(2,2),(-2,2)\}$

ج) $2g^2(x)+1=(-2,19),(1,3),(3,9),(-1,1)$

د) $\dfrac{2f}{g}\{(1,-4),(3,-1)\}$