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

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

$x^3 f(x+1)\geq 0 \Rightarrow$

ریشه

$\left(\frac{1}{2}\right)^{x-1}-1=0$

$\left(\frac{1}{2}\right)^{x-1}=1 \Rightarrow x=1$ $\qquad$ $x^3=0 \xRightarrow{\text{ریشه}} x=0$

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

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

$\cap$

	0	
$-$	0	$+$

	1	
$+$	0	$-$

$D_f=[0,1]$

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

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

$x=1 \Leftarrow$ ریشه

$-x+|-x+2|\geq 0$ $\qquad$ $-x+|-x+2|=0$

$+x=|-x+2|$

if $-x+2\geq 0$

$2\geq x$

$x=-x+2$

$2x=2 \Rightarrow x=1$

if $-x+2\leq 0$

$2\leq x$

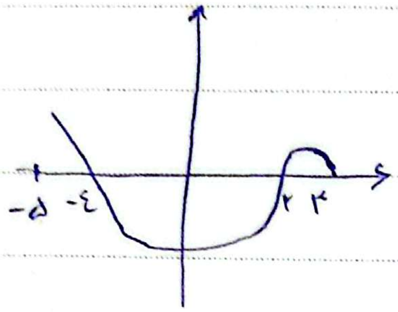
$x=x+2$ جواب ندارد

	1	
$+$	0	$-$

$D_f=(-\infty,1]$

(۳) دامنه

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



$D_{f(x)}=[-5,3]$

ریشه: $x-1=0$, $x=1$

$\frac{x-1}{f(x)}$ $f(x)=0$

ریشه: $x=-4,2,3$

	-5		-4		1		2		3	
X	|	−	0	+	0	−	0	+	0	X

$$D_f=(-4,1]\cup(2,3)$$

(۴) دامنه $y_1=\dfrac{1}{9x^4-7x^2-4x-3}$ = دامنه $y_2=\dfrac{1}{3x^2+ax+b}$

حاصل $\sqrt{-(a+b)}$

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

(ریشه مخرج

$$9x^4-6x^2-x^2-4x-4+1 \Rightarrow (3x^2-1)^2-(x+2)^2\neq 0$$

$$(3x^2-1)^2\neq(x+2)^2 \Rightarrow \sqrt{(3x^2-1)^2}\neq\sqrt{(x+2)^2}$$

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

$\frac{1}{3}$ -2

$3x^2-1=x+2$

$3x^2-x-3=0$

$\Downarrow$

$3x^2+ax+b=0$

$a=-1$, $b=-3$

$$\sqrt{-(-1-3)}=\sqrt{4}=2$$

(۵) $f(x) = x^3 + x$ دامنه $y = \sqrt{f(x) - f(\frac{4}{x})}$

$x \neq 0$

$$x^3 + x - \left(\frac{4}{x}\right)^3 - \frac{4}{x} = x^3 + x - \frac{64}{x^3} - \frac{4}{x}$$

$$\frac{x^6 + x^4 - 64 - 4x^2}{x^3} = \frac{1}{x^3}\left(x^6 + x^4 - 4x^2 - 64\right)$$

$$\frac{1}{x^3}\big(\underbrace{x^6 - 64}_{4^3}\big) + \frac{1}{x}\left(x^2 - 4\right)$$

$$\frac{1}{x^3}\big(\underbrace{x^2 - 4}_{(x+2)(x-2)}\big)\left(x^4 + 4x^2 + 16\right) + \frac{1}{x}(x+2)(x-2)$$

$$= (x+2)(x-2)\frac{1}{x}\Big(\underbrace{\frac{1}{x^2}\big(\underbrace{x^4 + 4x^2 + 16}_{\Delta < 0}\big) + 1}_{\text{عبارت مثبت}}\Big)$$

	-2		0		2	
$-$	0	$+$	$\times$	$-$	0	$+$

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

بنام خداوند ...

Subject : (   )   Date :

⑥ $f(x^3+x)=2x^2-1$ حاصل $f(2)+f(10)$

$x^3+x=2$

$x=1 \Longrightarrow f(2)=2(1)^2-1=1$

$x=2 \Longrightarrow f(10)=\underbrace{2\times(2)^2}_{8}-1=7$

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

$-8+8$

⑦ $f(x)=x^3-6x^2+12x$ و $g(x)=x^3+9x^2+27x+27$ حاصل $\dfrac{g(\sqrt[3]{7}-3)}{f(\sqrt[3]{2}+2)}$

-27 $3\underbrace{a^2}_{x^2}b=9x^2 \;\; b=3$

$3\underbrace{a^2}_{x^2}b=-6x^2 \;\; 3b=-6 \;\; \boxed{b=-2}$

$f(x)=(x-2)^3+8 \qquad g(x)=(x+3)^3-27$

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

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

Arman

Subject : (   )   منبع فرارود دانش   Date :

۸) $f(x)=\sqrt{x+4\sqrt{x-4}}$ ، $g(x)=\sqrt{x-4\sqrt{x-4}}$ برای $x\geq 4$

$f(x)+g(x)=a+b\sqrt{x+c}$ $\frac{a+b}{c}$

$(f(x)+g(x))^2=\left(\sqrt{x+4\sqrt{x-4}}+\sqrt{x-4\sqrt{x-4}}\right)^2$

$=x+4\sqrt{x-4}+x-4\sqrt{x-4}+2\left(\sqrt{x-4\sqrt{x-4}}\right)\left(\sqrt{x+4\sqrt{x-4}}\right)$

$\downarrow\ 2x+2|x-8|$ $\sqrt{(x-4\sqrt{x-4})(x+4\sqrt{x-4})}$

if $4\leq x<8 \Rightarrow 2x+\underbrace{2(-x+8)}_{-2x+16}=16$ $\underbrace{x^2-16\times(x-4)}$

$\overset{\text{جذر}}{\Rightarrow}\ \sqrt{16}=4$ $x^2-16x+64$

if $x\geq 8 \Rightarrow 2x+\underbrace{2(x-8)}_{2x-16}\Rightarrow 4x-16$ $(x-8)^2$

$\overset{\text{جذر}}{\Rightarrow}\ \underbrace{\sqrt{4x-16}}_{4(x-4)}\ 2\sqrt{x-4}=a+b\sqrt{x+c}$ جذر

$a\to 0,\quad b\to 2,\quad c\to -4$

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

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

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

ریشه ۳   ریشه ۱

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

$(6,6)$

$\frac{2+2}{\underbrace{4-8+3}_{-1}}=-4$

$\frac{6+2}{\dots+3}=\frac{8}{3}$

Subject : (   )   Date :

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

الف) $f(2x)$

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

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

$x^2=-1$ غ ق ق

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

ج) $2g^2(x)+1$

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

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

غ ق ق