۱

$x=a \Rightarrow f(x) \to a^2+2a$, $\to a^2-4$

$a^2+2a=a^2-4 \Rightarrow 2a=-4 \Rightarrow a=-2$

۲

$f(2)=3 \Rightarrow \frac{2^2+a}{2\times 2-b}=3 \Rightarrow \frac{4+a}{4-b}=3 \to \frac{4+a}{4-(-1)}=3 \to 4+a=15 \Rightarrow a=11$

$g(2)=3 \Rightarrow 2\times 2+b=3 \Rightarrow b=-1$

$\Rightarrow f(x)=\frac{x^2+11}{2x+1} \Rightarrow f(1)=\frac{12}{3}=4$

۳

$f(x)=\frac{4x+1}{2x^2+ax+b}$, دامنه $=\mathbb{R}-\{-1,4\} \to 2x^2+ax+b=2(x+1)(x-4)=2(x^2-3x-4)$

$=2x^2-6x-8$

$\Rightarrow f(x)=\frac{4x+1}{2x^2-6x-8} \to f(1)=\frac{4+1}{2-6-8}=\frac{5}{-12}$

۴

$f(x)=\frac{x^3-\sqrt{3^3}}{-4x^2+ax+b}$ دامنه $=\mathbb{R}-\{-1\} \to -4x^2+ax+b=-4(x+1)^2=-4(x^2+2x+1)$

$=-4x^2-8x-4 \Rightarrow a+b=-8-4=-12$

۵

$f(x)=\frac{2x}{(x-1)(x^2+mx+1)}$, دامنه $=\mathbb{R}-\{1\}$

$x^2+mx+1=(x-1)^2 \Rightarrow m=-2$ (II) ، x^2+mx+1 ریشه ندارد $\to \Delta<0 \Rightarrow m^2-4<0 \Rightarrow m^2<4$

$\Rightarrow -2<m<2$ (II)

(I) $\cup$ (II) $\Rightarrow m=(-2,2)$

۶

$f(x)=\sqrt{4-\frac{1}{x^2}}$, $x\neq 0$ (I) , $4-\frac{1}{x^2}\geq 0 \to 4\geq \frac{1}{x^2} \Rightarrow x^2 \geq \frac{1}{4}$

II $x\geq \frac{1}{2}$ III $x\leq -\frac{1}{2}$

دامنه $=$ (I) $\cap$ ((III) $\cup$ (II)) $=(-\infty,-\frac{1}{2}]\cup[\frac{1}{2},+\infty)$

۷

$f(x)=\sqrt{mx^2+2mx+1}$ دامنه $=\mathbb{R}$, $m\geq 0$ (I)

$\Delta\leq 0 \Rightarrow 4m^2-4m\leq 0$

$\Rightarrow 4m(m-1)\leq 0 \to$ (II)

	0		1	
	$+$	0	$-$	0

$\to m=$ (I) $\cap$ (II) $=[0,1]$

$$f(x)=\begin{cases}\frac{4x^2-1}{2x-1} & x\neq a \\ 4x+k & x=\frac{1}{2}\end{cases}$$ مثل $\mathbb{R}-\{\frac{1}{2}\}$ $a=\frac{1}{2}$

$g(x)=2x+1 \rightarrow x=\frac{1}{2} \Rightarrow 4\times\frac{1}{2}+k=2\times\frac{1}{2}+1 \Rightarrow k=0$

$k+a=0+\frac{1}{2}=\frac{1}{2}$

۱

$$f(x)=\begin{cases}\frac{9x^2-4}{3x+2} & x\neq\frac{-2}{3} \\ 3ax+2 & x=\frac{-2}{3}\end{cases}$$

$x=1 \Rightarrow \frac{9-4}{3+2}=2+b \rightarrow 1=2+b \Rightarrow b=-1$

$g(x)=3x+b$

$x=\frac{-2}{3} \Rightarrow -2a+2=-2-1 \Rightarrow a=+3$

$\Rightarrow a-b=0$

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$$f(x)=\begin{cases}\frac{x^2-4}{x-2} & x\neq 2 \\ 2a^2+ax & x=2\end{cases}$$

$g(x)=x+2 \rightarrow x=2 \Rightarrow 2+2=2a^2+2a \rightarrow a^2+a=2 \Rightarrow a^2+a-2=0 \rightarrow a=\frac{-1\pm\sqrt{1+8}}{2}$

$a=-2, 1$

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