①

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

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

$a=-2$

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②

$f(x)=\dfrac{x^2+a}{2x-b}$ $g(x)=2x+b$

$g(2)=3 \Rightarrow 4+b=3 \Rightarrow b=-1$

$f(2)=3 \Rightarrow \dfrac{x^2+a}{2x+1} \Rightarrow \dfrac{4+a}{4+1}=3 \quad \dfrac{4+a}{5}=3$

$a=11$

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

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③

$f(x)=\dfrac{4x+1}{2x^2+ax+b}$ $D_f = \mathbb{R}-\{4,-1\} \Rightarrow$ ریشه‌های مخرج

$S=3 \Rightarrow a=-6$ $P=-4 \Rightarrow b=-8$ $f(x)=\dfrac{4x+1}{2x^2-6x-8}$

$f(1)=\dfrac{4+1}{2-6-8} \Rightarrow \dfrac{5}{-12}$

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④

$f(x)=\dfrac{x^3-\sqrt{3}}{-4x^2+ax+b}$ $D_f=\mathbb{R}-\{1\} \Rightarrow$ ریشه مضاعف

$\dfrac{-a}{-4}=2 \Rightarrow a=-8$ $\dfrac{b}{-4}=1$ $b=-4$

$a+b \Rightarrow -8-4=-12$

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⑤

$f(x)=\dfrac{2x}{(x-1)(x^2+mx+1)}$ $D_f=\mathbb{R}-\{1\}$

حالت $\Delta<0 \Rightarrow m^2-4<0 \quad (m+2)(m-2)<0 \quad m=(-2,2)$ ①

$\Delta=0 \Rightarrow m^2-4=0 \quad m=\pm 2$ ②

$① \cap ② = [-2,2]$

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$f(x)=\sqrt{\varepsilon-\frac{1}{x^2}} \Leftarrow \sqrt{\frac{\varepsilon x^2-1}{x^2}} \Leftarrow \varepsilon x^2-1\geq 0$ $\varepsilon x^2\geq 1$ $x^2\geq\frac{1}{\varepsilon}$

$x\geq\frac{1}{2}$ $x\leq -\frac{1}{2}$ $x\neq 0 \Rightarrow x>0$

$\Rightarrow D_f=[\frac{1}{2},+\infty)$

$\varepsilon x^2-1\geq 0 \to \varepsilon x^2\geq 1 \to x^2\geq\frac{1}{\varepsilon}$

$x\in(-\infty,-\frac{1}{2}]\cup[\frac{1}{2},+\infty)$

$f(x)=\sqrt{mx^2+2mx+1}$ $mx^2+2mx+1\geq 0$ $(2m)^2-4(m)(1)\leq 0$

$4m^2-4m\leq 0$ $4m(m-1)\leq 0$

	$-\infty$		0		1		$+\infty$
$4m$	$-$	$-$	0	$+$	$+$	$+$	
$m-1$	$-$	$-$		$-$	0	$+$	
$4m(m-1)$	$+$	$+$	0	$-$	0	$+$	

$m\in[0,1]$

$f(x)=\begin{cases}\frac{\varepsilon x^2-1}{2x-1} & ; x\neq a\\ 2x+k & ; x=\frac{1}{2}\end{cases}$

$g(x)=2x+1$

$g(\frac{1}{2})=2(\frac{1}{2})+k \Rightarrow \underbrace{\varepsilon(\frac{1}{2})+1}_{2}=\underbrace{\varepsilon(\frac{1}{2})}_{2}+k$ $k=0$

$2x-1=0$ $2x=1$ $x=\frac{1}{2}$ $\Rightarrow$ $a=\frac{1}{2}$ $a+k=\frac{1}{2}+0=\frac{1}{2}$ ✗

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

$g(x)=2a+b$

$x=-\frac{2}{3} \Rightarrow \varepsilon(-\frac{2}{3})a+2=\varepsilon(-\frac{2}{3})+b$

$-2a+2=-2+b$ (1)

$x=1 \Rightarrow \frac{9-\varepsilon}{2+2}=2+b \Rightarrow 1=2+b$ $b=-1$ (2)

(1),(2) $\Rightarrow -2a+2=-2-2 \Rightarrow -2a=-4$ $a=2$

$a-b=2+1=3$ ✗

$g(1)=f(2) \Rightarrow 2+2=2a^2+9$

$2a^2+2a-\varepsilon=0 \Rightarrow a^2+a-2=0$

$(a+2)(a-1)=0$

$a=+1,-2$ ✗