۱) $f(x)=\begin{cases} x^2+2x & x\geq a \\ ax-3 & x<a \end{cases}$

$a^2+2a=a^2-3$

$2a=-3 \Rightarrow a=-1$

۲) $f(x)=\frac{ax^2+a}{2x-b}$ $\quad g(x)=2x+b$

$\hookrightarrow 4=f+b$

$b=-1$

$\lim_{x\to 2}=\frac{f+a}{f-b}$

$(1) \hookrightarrow a=11$ $\quad f(1)=\frac{1+11}{3}=\frac{12}{3}=4$

۳) $f(x)=\frac{\sqrt{4x+1}}{ax^2+ax+b}$ $\quad D_f=\mathbb{R}-\{-1,4\}$

$\begin{cases} 2-a+b=0 \\ 32+16a+b=0 \end{cases} \Rightarrow a=-6$

$b=-7$

$f(1)=\frac{f(1)+1}{f(1)^2-f(1)-7}=\frac{-5}{11}$

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

$C\ (x+1)^2=0$

$-4(x^2+2x+1)=0 \Rightarrow -4x^2-8x-4=0$

$b=-4$

$a=-8$

$C \Rightarrow -4$ $\quad -8-4=-12$

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

ریشه‌ی مخرج ۱

① $\Delta<0 \Rightarrow m^2-4<0 \Rightarrow 4m^2<16 \Rightarrow -4m^2+16>0$ $\quad [-2,2)$

② $\Delta=0 \Rightarrow m=2$

۶) $f(x)=\sqrt{2-\frac{1}{x^2}}$ $\quad 2-\frac{1}{x^2}\geq 0 \Rightarrow \frac{2x^2-1}{x^2}\geq 0$

$x^2\neq 0$

	$-\frac{1}{\sqrt{2}}$		0		$\frac{1}{\sqrt{2}}$	
$2x^2-1$	+	0	−	0	+	
x^2	+		+		+	
	+	0	−	∄	+	

$D_f: (-\infty,-\frac{1}{\sqrt{2}}]\cup[\frac{1}{\sqrt{2}},+\infty)$

۷) $f(x)=\sqrt{mx^2+4mx+1}$ $\quad mx^2+4mx+1\geq 0$

$a>0$:

② $\Delta>0 \Rightarrow m=0$ ✗ ① ✓

$D_f: [0,+\infty)$

① $\Delta\leq 0 \Rightarrow 4m^2-4m\leq 0$

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

	0		1	
$4m$	−	0	+	
$m-1$	−		−	0
	+	0	−	0

$[0,1]$

۸) $f(x) = \begin{cases} \frac{4x^2-1}{2x-1} & x \neq a \\ 4x+k & x = \frac{1}{2} \end{cases}$ → پیوسته $\qquad g(x) = 2x+1$

$2a+k = 2$

$k = 0$

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

$2x-1 \neq 0$

$2a-1 \neq 0$

$2a \neq 1$

$a \neq +\frac{1}{2} \Rightarrow a = \frac{1}{2}$

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۹) $f(x) = \begin{cases} \frac{9x^2-4}{6x+2} & x \neq -\frac{2}{3} \\ 2ax+2 & x = \frac{2}{3} \end{cases}$ $\qquad g(x) = 3x+b$

$\frac{9x^2-4}{2x+2} = 3x+b$

$-2a+2 = -2b$ $\quad -2$

$-2a = -6$

$a = +3$

$a-b = 3-(-1)$

(۴)

$(3x-2)(3x+2) = (2x+2)(3x+b)$

$b = -2$

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

$2a^2+2a = 4$

$a^2+a-2 = 0$

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

$a = -2$ یا $a = 1$