نام و نام خانوادگی: آرمیتا چمنی — شماره کلاسی: ۱۲ — کلاس: 12B

$$g(x)=f(\tan^2 x+\sqrt{2}\cos x)$$
$$\Rightarrow g'(x)=\left((2(1+\tan^2 x)\tan x)-\sqrt{2}\sin x\right)f'(\tan^2 x+\sqrt{2}\cos x)$$
$$g'(\tfrac{\pi}{4})=((2(1+1)(1)-1)f'(1+\sqrt{2}(\tfrac{\sqrt{2}}{2}))\Rightarrow \sqrt{10}=3f'(2)$$
$$\Rightarrow \boxed{f'(2)=\frac{\sqrt{10}}{3}}$$ ۱

$$f(x)=\frac{8+\cos^3 x}{4-\cos^2 x}=\frac{(2+\cos x)(4-2\cos x+\cos^2 x)}{\cancel{(2+\cos x)}(2-\cos x)}=\frac{\cos^2 x-2\cos x+4}{2-\cos x}$$ ۲
$$g(x)=\frac{2}{2-\cos x}$$
$$f'(\tfrac{7\pi}{6})-2g'(\tfrac{7\pi}{6})=(f(\tfrac{7\pi}{6})-2g(\tfrac{7\pi}{6}))'=\left(\frac{\cos^2 x-2\cos x+4}{2-\cos x}-\frac{4}{2-\cos x}\right)'$$
$$=(-\cos x)'=\sin x=\sin\tfrac{7\pi}{6}=-\tfrac{1}{2}$$

$$f(x)=|4x-3|\sqrt{ax}$$
$$f'_+(\tfrac{3}{4})=((4x-3)\sqrt{ax})'=4\sqrt{\tfrac{3}{4}a}$$ ۳
$$f'_-(\tfrac{3}{4})=((3-4x)\sqrt{ax})'=-4\sqrt{\tfrac{3}{4}a}$$
$$|f'_+(\tfrac{3}{4})-f'_-(\tfrac{3}{4})|=8\sqrt{ax}=8\sqrt{\tfrac{3}{4}a}=4\sqrt{3a}=2\sqrt{12a}\Rightarrow a=\tfrac{1}{2}$$

$$y+ax=2\Rightarrow y=-ax+2 \qquad f'(4)=-\tfrac{3}{5}$$
$$f(4)+f'(4)=-1$$ ۴
$$-4a+2+-a=-1$$
$$-5a=-3 \quad a=\tfrac{3}{5}$$

$$7y-x=5 \qquad y=\frac{ax-1}{3x+1}$$
$$y=\frac{x}{7}+\frac{5}{7}$$
$$y'=\frac{1}{7}$$
$$\frac{ax-1}{3x+1}=\frac{x+5}{7}\Rightarrow 7ax-7=3x^2+x+15x+5$$
$$\Rightarrow 3x^2+(16-7a)x+12=0$$ ۵
$$\Delta=0\Rightarrow 16-7a=12\Rightarrow a=\tfrac{4}{7} \text{ غ ق ق}$$
$$16-7a=-12\Rightarrow \boxed{a=4}$$
زیرا طول نقطه تماس ... یعنی $\alpha>0$
$$M(\alpha,\frac{\alpha+5}{7})$$

$f(x)=x^3+ax-b$

$f(2)=8+2a-b=0$ $\boxed{b=-16}$ $b-a=-16+12=-4$

$f'(x)=3x^2+a \Rightarrow f'(2)=12+a=0$ 6

$\boxed{a=-12}$

$f(x)=\sin^n(x^2)$ $2m+n=9$

$\lim\limits_{x\to 0}\frac{f(x)f'(x)}{(1-\cos x)^m}=32\sqrt{2}$

$\lim\limits_{x\to 0}\frac{(\sin^n(x^2))(2x(n)(\cos x^2)(\sin^{n-1}x^2))}{(1-\cos x)^m}=\lim\limits_{x\to 0}\frac{(x^{2n})(2x)(n)(1-\frac{x^4}{2})x^{2n-2}}{(\frac{x^2}{2})^m}$ 7

$=\frac{(x^{4n-1})(2n)2^m}{x^{2m}}$ $4n-1=2m$

$2^{m+1}n=32\sqrt{2}$

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

$\sqrt{x}+1=2\sqrt{x}-2$

$3=\sqrt{x}\Rightarrow x=9$ $\Rightarrow f'(9)=\frac{1}{2(3)}\left(\frac{-2}{(2)^2}\right)=-\frac{1}{12}$ 8

$f'^{-1}(2)=\frac{1}{f'(9)}=-12$

$f(x)=(x^2+1)^3(ax+1)$ $[-1,0]$ $x=-\frac{1}{a}=1$

$f(0)=(0+1)^3(a(0)+1)=1$ $\frac{f(b)-f(a)}{b-a}=\frac{1+8a-8}{0+1}=8a-7=-11$ 9

$a=-\frac{1}{2}$

$f(-1)=(1+1)^3(-a+1)=-8a+8$

$f'(x)=3(2x)(x^2+1)^2(-\frac{x}{2}+1)+(-\frac{1}{2})(x^2+1)^3$

$=3(2)(2)^2(\cancel{1}/2)+(-\frac{1}{2})(2)^3=12-4=8$

$g=\sin x\cos 2x$ $[\frac{\pi}{4},\frac{\pi}{2}]$ $g=\sin^4x-\cos^4x$

$g=-\cos 2x$

$\frac{f(b)-f(a)}{b-a}=\frac{-1-0}{\frac{\pi}{2}-\frac{\pi}{4}}=-\frac{4}{\pi}$ $\frac{1-0}{\frac{\pi}{2}-\frac{\pi}{4}}=\frac{4}{\pi}$ 10

$\frac{-\frac{4}{\pi}}{\frac{4}{\pi}}=-1$