$f = x^3 + ax - b$ $y=0$ $f'(x) = 3a^2 + a$ $y'=0$ $f(2) = 0 = 8 + 2a - b$ $\overbrace{8 - 24}^{-16} = b$ $f'(2) = 0 = 12 + a$ $a = -12$ $-16 + 12 = \boxed{-4}$	۶
$f'(x) = n\left(\cos(x^2)\,2x\right)\left(\sin^{n-1}(x^2)\right)$	۷
$f^{-1}\Big\vert_{9}^{2}$ $f\Big\vert_{2}^{9}$ $\frac{1}{m}$ m $\frac{\sqrt{x}+1}{\sqrt{x}-1} = 2$ $\sqrt{x}+1 = 2\sqrt{x} - 2$ $\sqrt{x} = 3$ $x = 9$ $f(x) = \frac{\sqrt{x}-1}{\sqrt{x}-1} + \frac{2}{\sqrt{x}-1}$ $1 + 2(\sqrt{x}-1)^{-1}$ $f'(x) = \frac{-2\left(\frac{1}{2\sqrt{x}}\right)}{(\sqrt{x}-1)^2} = \frac{-\frac{1}{3}}{2\times 2} = -\frac{1}{12} = m \Rightarrow \boxed{\frac{1}{m} = -12}$	۸
$\frac{f(0) - f(-1)}{0+1} = -11$ $f'(-2 \times \frac{1}{-2}) = f'(1)$ $1 - 8(1-a) = -11$ $f'(x) = 3(2x)(x^2+1)^2(-\frac{1}{2}x+1) + (-\frac{1}{2})(x^2+1)^3 = 8$ $2(1-a) = +\frac{3}{2}$ $a = -\frac{1}{4}$	۹
$f = \sin x \cos 2x$ $g = (\sin^2 - \cos^2)\cancel{(\sin^2 + \cos^2)}$ $\sin^2 - \cos^2 = -\cos 2x$ $\frac{\frac{f(\frac{\pi}{4}) - f(\frac{\pi}{2})}{\frac{\pi}{4} - \frac{\pi}{2}}}{\frac{g(\frac{\pi}{4}) - g(\frac{\pi}{2})}{\frac{\pi}{4} - \frac{\pi}{2}}} = \frac{f(\frac{\pi}{4}) - f(\frac{\pi}{2})}{g(\frac{\pi}{4}) - g(\frac{\pi}{2})}$ $\frac{\sin(\frac{\pi}{4})\cos(\frac{\pi}{2}) - \sin(\frac{\pi}{2})\cos(\pi)}{-\cos(\frac{\pi}{2}) + \cos(\pi)} = -1$	۱۰

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$g(x) = f(\tan^2 + \sqrt{2}\cos)$ $g'(x) = f'(\tan^2 + \sqrt{2}\cos)(2(1+\tan^2)\tan - \sqrt{2}\sin)$ $g'(\frac{\pi}{4}) = f'(2)\left(2(1+1)(1) - \sqrt{2}\times\frac{\sqrt{2}}{2}\right) = \sqrt{3}$ $f'(2) = \frac{\sqrt{3}}{3}$ $(\cos+1)^2 + 3$ ۲	۱
$f = \frac{(2+\cos)(4+\cos^2+2\cos)}{(2+\cos)(2-\cos)}$ $g = \frac{2}{2-\cos}$ $f'(x) = \frac{(2-\cos)(-2\sin) - (\sin)((\cos+1)^2+3)}{(2-\cos)^2}$ $-2g' = \frac{+4(+\sin)}{(2-\cos)^2}$ $\sin(\frac{7\pi}{6}) = -\frac{1}{2}$ $\cos(\frac{7\pi}{6}) = -\frac{\sqrt{3}}{2}$ $f' - 2g' = \frac{\sin}{(2-\cos)^2}\left(2(\cos-2) - (\cos+1)^2 - 3 + 4\right) = \frac{-\sin(5-\sin^2)}{(2-\cos)^2} = \frac{-\frac{1}{2}(5-\frac{1}{4})}{(\frac{4+\sqrt{3}}{2})^2} = \frac{\frac{19}{4}}{\frac{19+8\sqrt{3}}{4}}$ ۲	۲
$\lim_{x\to\frac{3}{4}} \frac{\lvert 4x-3\rvert\sqrt{ax}}{(x-\frac{3}{4})}$ → $+4\sqrt{3a}$, $-2\sqrt{3a}$ $2\times 2\sqrt{3a} = 2\sqrt{6}$ $\sqrt{a} = \frac{\sqrt{2}}{2}$ $a = \frac{1}{2}$ ۲	۳
$f(4) = -4a + 2$ $y = -ax + 2$ $f'(4) = -a$ $y' = -a$ $\frac{f+f'}{-1} = -5a + 2$ $-3 = -5a$ $a = \frac{3}{5}$ $f'(5) = -\frac{3}{5}$ ۲	۴
$y = \frac{1}{7}x + \frac{5}{7}$ $y = \frac{ax-1}{3x+1}$ $3x^2 + 16x + 5 = 7ax - 7 \longrightarrow \Delta = 0$ $3x^2 + (16-7a)x + 12 = 0$ $y' = \frac{1}{7}$ $y' = \frac{a+3}{(3x+1)^2}$ $(16-7a)^2 = 4(3)(12) = 0$ $16 - 7a = 12$ $\boxed{a = -\frac{4}{7}}$ ۱/۵	۵

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$$\frac{ax-1}{3x+1}=\frac{x}{7}+\frac{5}{7}\longrightarrow 7ax-7=3x^2+x+15x+5$$

$$3x^2+x(16-7a)+12=0\xrightarrow{\Delta=0}(16-7a)^2-12^2=(16-7a-12)(16-7a+12)$$

$\boxed{a=\frac{4}{7}}$ $\boxed{a=4}$

$\boxed{a=4}\longrightarrow 3x^2-12x+12\longrightarrow \boxed{x=2}$ ✓

$a=\frac{4}{7}\longrightarrow 3x^2+12x+12\longrightarrow x=-2$ ✗ ناحیه اول

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$$\lim_{x\to 0}\frac{\sin^n(x^2)\times 2x\sin^{n-1}(x^2)\times\cos x^2}{\left(2\sin^2\frac{x}{2}\right)^m}\xrightarrow{\text{هم ارزی}}\lim_{x\to 0}\frac{(x^2)^n\times n\times(x^2)^{n-1}\times 2x}{\left(2\left(\frac{x}{2}\right)^2\right)^m}=\frac{(x)^{2n+2n-2+1}\times 2n}{(x)^{2m}\times\frac{1}{2^m}}$$

$$=\frac{2nx^{4n-1}}{\frac{1}{2^m}\times x^{2m}}=2^{m+1}\times n\times x^{4n-2m-1}$$

$4n-2m-1=0\longrightarrow n=\frac{2m+1}{4}$

$2^{m+1}\times\frac{2m+1}{4}=32\sqrt{2}\longrightarrow m=\frac{7}{2}\,,\ n=2\longrightarrow \boxed{2m+n=9}$