۱۲,۲۵

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$g'(x) = 2(1+\tan^2 x)(\tan x) - \sqrt{2}\sin x \times f'(\tan^2 x + \sqrt{2}\cos x)$ $g'(\frac{\pi}{4}) = 2\times 2\times 1 + 1 - 1 \times f'(2) = \sqrt{3}$ $\quad f'(2) = \frac{\sqrt{3}}{4}$ ۲ ✓	۱
۰,۵ $f(x) = \frac{(2+\cos x)(\cos^2 x + 4 - 2\cos x)}{(\cos x + 2)(2-\cos)} \Rightarrow f'(x) = \frac{(-2\sin\cos + 2\sin)(2-\cos) - (\sin)(\cos^2 - 2\cos ...)}{(2-\cos)^2}$ $g(x) = \frac{2}{2-\cos} \Rightarrow \frac{-(2\sin x)}{(2-\cos)^2} = g'(x)$ $\quad f'(\frac{7\pi}{4}) =$ $f'(\frac{7\pi}{4}) - 2g'(\frac{7\pi}{4}) = (f-2g)'(\frac{7\pi}{4})$ $\rightarrow (f-2g)' = \left(\frac{8+\cos^3 x}{4-\cos^2 x} - \frac{4}{2-\cos x}\right) =$ $\left(\frac{(\cos x+2)(\cos^2 x - 2\cos x + 4)}{(2-\cos x)(2+\cos x)} - \frac{4}{2-\cos x}\right) = \left(\frac{\cos(\cos x - 2)}{-(\cos x - 2)}\right)' = -(\cos x)' = \sin x \xrightarrow{x = 7\pi/4} \sin(\frac{7\pi}{4}) = \frac{-1}{2}$	۲
$f'_+(\frac{3}{4}) \Rightarrow$ ~~...~~ $4\sqrt{\frac{3}{4}a} = f'_+(\frac{3}{4})$ $-2\sqrt{\frac{3}{4}a} = f'_-(\frac{3}{4})$ $\cancel{4}\sqrt{\frac{3}{4}a} = 2\sqrt{2} \Rightarrow \sqrt{2} = \sqrt{\frac{3}{4}a \times 4}$ $12a = 4 \quad a = \frac{1}{3}$ ✓ ۲	۳
$f(4) = -4a + 2 = \frac{12}{5} + 2 = \frac{22}{5}$ $f'(4) = -a \quad \Rightarrow -5a + 2 = -1 \Rightarrow a = \frac{3}{5}$ ۱,۷۵ $f'(4) = -\frac{3}{5}$	۴
$y = \frac{x+5}{7} \quad \frac{ax-1}{3x+1} = \frac{x+5}{7} \Rightarrow 7ax - 7 = 3x^2 + 16x + 5$ $3x^2 + (16-7a)x + 12 = 0$ ~~...~~ $= 0$ $a \begin{cases} 4 ✓ \\ \frac{4}{7}\ a \end{cases}$ ✓ ۲	۵

$8 \,|\, \frac{2}{1}$ $\quad f(2) = 8 - \overset{-16}{24} - b = 2 \quad b = 16$

$f'(x) = 3x^2 + a = 12 + a = 1 \quad a = -11 \quad b - a = 27$

$\begin{cases} f(2) = 0 \longrightarrow 8 + 2a - b = 0 \\ f'(2) = 0 \longrightarrow 3x^2 + a = 0 \longrightarrow 12 + a = 0 \to a = -12 \end{cases}$

$\to 2a - b = -8 \xrightarrow{a=-12} b = -16 \qquad b - a = -16 - (-12) = -4$

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$\lim_{x\to 0} \frac{\sin^n(x^2) \times n \sin^{n-1}(x^2) \times \cos(x^2) \times (2x)}{(2\sin^2 \frac{x}{2})^m} \xrightarrow{\text{Sin}} \lim_{x\to 0} \frac{(x^2)^n n (x^2)^{n-1} \times 2x}{(2(\frac{x}{2})^2)^m} =$

$\lim_{x\to 0} \frac{2n x^{2n+2n-2+1}}{(\frac{x^2}{2})^m} = \lim_{x\to 0} \frac{2n x^{4n-1}}{\frac{1}{2^m} x^{2m}} = \lim_{x\to 0} 2^{m+1} n x^{4n-2m-1}$ ⟵ حاصل حد عدد متناهی غیرصفر ← توان صفر

$\begin{cases} 4n - 2m - 1 = 0 \longrightarrow n = \frac{2m+1}{4} \\ 2^{m+1} n = 32\sqrt{2} \end{cases} \longrightarrow 2^{m+1} \times \frac{2m+1}{4} = 32\sqrt{2} \to (2m+1) 2^{m+1} = 2^7 \sqrt{2} \to m = \frac{7}{2} \quad 2m + n = 9$

$n = 2$

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

$f(x) = \frac{\sqrt{x}+1}{\sqrt{x}-1} \to \sqrt{x}y - y = \sqrt{x} + 1 \longrightarrow \sqrt{x}(y-1) = y + 1 \to \sqrt{x} = \frac{y+1}{y-1} \to x = (\frac{y+1}{y-1})^2 \longrightarrow y = (\frac{x+1}{x-1})^2$

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

$(f^{-1}(2))' = 2 \times 3 \times (-2) = -12$

$\frac{-1}{3\sqrt{2} - 4} = \frac{-(3\sqrt{2} + 4)}{2}$

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$f(0) = 1 \qquad -11 = \frac{1 + 8a - 8}{1} = 8a - 7 \Rightarrow -4 = 8a \Rightarrow -\frac{1}{2} = a$

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

$f'(1) = \underbrace{3 \times 2x (x^2+1)^2 (-\frac{1}{2}x + 1)}_{3 \times \cancel{2} \times 4 \times \frac{1}{\cancel{2}}} + \underbrace{\frac{-1}{2}(x^2+1)^3}_{\frac{-1}{\cancel{2}} \times 8} = 8$

۲ ۹

$f(\frac{\pi}{2}) = 1 \times -1 = -1 \qquad \frac{-1}{\frac{\pi}{4}} = \frac{-4}{\pi}$

$f(\frac{\pi}{4}) = \frac{\sqrt{2}}{2} \times 0 = 0$

$f(\frac{\pi}{4}) = 1 \qquad \Rightarrow \frac{\frac{-4}{\pi}}{\frac{4}{\pi}} = -1$

$f(\frac{\pi}{4}) = 0 \qquad \frac{+1}{\frac{\pi}{4}} = \frac{4}{\pi}$

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