ملینا کبیری

Subject: (   )   Date: ....

①

$g'(x) = 2(\tan x)(1+\tan^2 x) - \sqrt{2}\sin x \times f'(\tan^2 x + \sqrt{2}\cos x)$

$g'(\frac{\pi}{4}) = 4 \times f'(2) - \sqrt{3} \to f'(2) = \frac{\sqrt{3}}{3}$

②

$f(x) = \frac{8+\cos^3}{2+\cos} \times \frac{4-2\cos+\cos^2}{2-\cos} \qquad g(x) = \frac{2}{2-\cos}$

$f'(\frac{7\pi}{4}) - 2g'(\frac{7\pi}{4}) = (f-2g)'(\frac{7\pi}{4})$

$f - 2g = \frac{\cos^2 - 2\cos x + 4 - 4}{2-\cos} = -\cos \to \sin x$

$(f-2g)'(\frac{7\pi}{4}) = \sin\frac{7\pi}{4} = -\frac{1}{2}$

③

$A\ x > \frac{3}{2} \to (2x-3)\sqrt{ax} = 4\sqrt{ax}$

$AA\ x < \frac{3}{2} \to (-2x+3)\sqrt{ax} = -4\sqrt{ax}$

$A - AA = 2(4\sqrt{ax}) = 2\sqrt{6} \xrightarrow{\frac{3}{2}} \sqrt{6} \to a = \frac{1}{4}$

④

$\to y = 2 - ax \qquad f(4) = 2 - 4a$

$f'(4) = a \to f(4) + f'(4) = 2 - 4a \quad a - 2 - 5a = -1 \quad a = \frac{2}{5}$

$f'(4) = -\frac{2}{5}$

⑤

$\frac{1}{7} = \frac{a+3}{(3x+1)^2} \Rightarrow a = \frac{(3x+1)^2 - 21}{7}$

$\frac{a+x}{7} = \frac{ax-1}{3x+1} \to \frac{a+x}{7} = \frac{x(3x+1)^2 - 21x - 7}{7(3x+1)}$

$9x^3 + 6x^2 - 24x - 8 = 0 \to (x^2-4)(3x+1) = 0$

غیرقابل

$x = 2$ ناصفر

$a = 4$

— *Arman* —

$f'(x)=3x^2+a \xrightarrow{(2,0)} 12+a=0 \to a=-12$ (7)

$f(x)=x^3-12x-b \xrightarrow{(2,0)} 8-24-b=0 \to b=-16$

$b-a=-4$

$\frac{\sqrt{x}+1}{\sqrt{x}-1} \to \frac{\sqrt{y}+1}{\sqrt{y}-1} \to y=\left(\frac{x+1}{x-1}\right)^2$ (8)

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

-12

$\frac{f(0)-f(-1)}{0+1}=1-8(-a+1) \Rightarrow a=\frac{1}{2}$ 9

$f'(1)=3(x^2+1)^2(2x)\left(\frac{-x}{2}+1\right)-\frac{1}{2}(x^2+1)^3=\boxed{8}$

$y=\sin\cos\pi x$ 10

$\lim \frac{f(\frac{\pi}{2})-f(\frac{\pi}{4})}{\frac{\pi}{2}-\frac{\pi}{4}} = \frac{-1-0}{\frac{\pi}{4}} = \frac{-4}{\pi}$

$y=\sin^4-\cos^4=(\sin^2-\cos^2)(\sin^2+\cos^2)$

$\lim \frac{f(\frac{\pi}{2})-f(\frac{\pi}{4})}{\frac{\pi}{2}-\frac{\pi}{4}} = \frac{4}{\pi} = \boxed{1}$