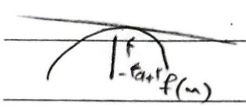
مشتق از g: $g'(x) = f'(\tan^2 x + \sqrt{2}\cos x) \times 2\tan x \times \frac{1}{\cos^2 x} \times -\sqrt{2}\sin x$ ـ۱

$\xrightarrow{x=\frac{\pi}{4}} \sqrt{3} = f'(2)\times 2\times 2\times -1 \Rightarrow f'(2) = \frac{-\sqrt{3}}{4}$

$f(x) = \frac{4-2\cos x+\cos^2 x}{2-\cos x} = -\cos x + \frac{4}{2-\cos x} \Rightarrow f'(x) = \sin x - \frac{4\sin x}{(2-\cos x)^2} \Rightarrow f'(\frac{7\pi}{6}) = -\frac{1}{2} + \frac{8}{(4+\sqrt{3})^2}$ ـ۲

$g'(x) = 2(-1)(2-\cos x)^{-2}\times \sin x \rightarrow g'(\frac{7\pi}{6}) = \frac{4}{(4+\sqrt{3})^2} \Rightarrow f'-2g' = -\frac{1}{2} + \frac{8}{(4+\sqrt{3})^2} - \frac{8}{(4+\sqrt{3})^2} = -\frac{1}{2}$

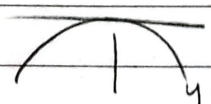
$\lim\limits_{x\to\frac{3}{4}} \frac{|4x-3|\sqrt{ax}}{x-\frac{3}{4}}$ $\begin{cases} \xrightarrow{\frac{3}{4}^+} 2\sqrt{4a} \\ \xrightarrow{\frac{3}{4}^-} -4\sqrt{4a} \end{cases}$ $\overset{4}{8}\sqrt{4a} = 2\sqrt{9}$, $\sqrt{64a} = \sqrt{9} \Rightarrow a = \frac{9}{64} = \frac{3^2}{4^3}$ ـ۳



$y = -ax+2$

$f'(4) = -a,\ f(4) = -4a+2 \Rightarrow -5a+2 = -1 \Rightarrow a = \frac{3}{5}$ ـ۴

$f'(4) = -\frac{3}{5}$



$y_2 = \frac{x}{7}+\frac{5}{7}$, $y_1 = \frac{ax-1}{3x+1}$

$\Rightarrow$ معادله‌ها را برابر هم قرار می‌دهیم $\Rightarrow \frac{ax-1}{3x+1} = \frac{x}{7}+\frac{5}{7}$

$\Rightarrow 3x^2 + (16-7a)x + 12 = 0 \xrightarrow{\Delta=0} (16-7a)^2 - 4(3)(12) = 0$

$\Rightarrow \begin{cases} a = 4 \checkmark \\ a = \frac{4}{7} \Rightarrow \times \end{cases}$ مشترک نبود

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

$b - a = -16+12 = -4$

$f'(x) = n\sin^{n-1}(x^2)\times\cos(x^2)\times 2x,\ f(x) = \sin^n(x^2) \sim x^{2n}$ ـ۷

$f'(x) \sim nx^{2n-2}\times 2x = 2n\,x^{2n-1} \Rightarrow f(x)f'(x) = 2n\,x^{4n-1}$

$(1-\cos x)^m \sim (\frac{x^2}{2})^m \Rightarrow$ حد: $\lim \frac{ff'}{(1-\cos x)^m} \sim 2n\times 2^m\times x^{4n-1-2m}$

برای اینکه حد عدد متناهی شود $\Rightarrow m = 2n - \frac{1}{2},\ 2^{m+1}\times n = 32\sqrt{2} \xrightarrow{\ } 2^{(2n-\frac{1}{2})+1} n = 32\sqrt{2}$

$= 2^{\frac{11}{2}} \Rightarrow \frac{1}{2}+2n = \frac{11}{2} \rightarrow n = \frac{5}{2},\ m = \frac{9}{2},\ 2m+n = 11/5$

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Date

۸- $\dfrac{\sqrt{x}+1}{\sqrt{x}-1}=2 \to x=9 \to f'(9)=\dfrac{-2\sqrt{9}}{(\sqrt{9}-1)^2}=\dfrac{-3}{2} \to {f^{-1}}'(2)=-\dfrac{2}{3}$

۹- آهنگ متوسط $=\dfrac{f(0)-f(-1)}{1}=1-(8\times(a+1))=-8a-7=-11 \to a=-\dfrac{1}{2}$

$f'(1)=?$ $\quad f(x)=(x^2+1)^3(\dfrac{-x}{2}+1) \to$

$f'(x)=3(x^2+1)^2\times 2x(\dfrac{-x}{2}+1)+(x^2+1)^3(-\dfrac{1}{2}) \xrightarrow{x=1} 12\times1-4=8$

۱۰- آهنگ متوسط ① $=\dfrac{f(\frac{\pi}{2})-f(\frac{\pi}{4})}{\frac{\pi}{4}}=\dfrac{-1-(0)}{\frac{\pi}{4}}=\dfrac{-4}{\pi}$

$y=\sin^2x-\cos^2x=-\cos 2x \to$ آهنگ متوسط ② $=\dfrac{f(\frac{\pi}{2})-f(\frac{\pi}{4})}{\frac{\pi}{4}}=\dfrac{+1-(0)}{\frac{\pi}{4}}=\dfrac{4}{\pi}$

$\dfrac{①}{②}=-1$