(سرا اسینی راد)

① 
$\cos^3(2x)+ax^2+b \to f'(x)=3\times 2(-\sin 2x)\times\cos^2 2x+2ax$

$-6\sin 2x\cos^2 2x+2ax \xrightarrow{hop} \dfrac{-6(2\cos 2x\times\cos^2 2x+\sin 2x\times 2\cos 2x\times(-2\sin 2x))+2a}{1}=2$

$\to 2a=2 \Rightarrow a=1$ $\qquad \lim_{x\to 0^+}\dfrac{f(x)}{x}=1 \to \dfrac{\cos^3(2x)+ax^2+b}{x} \to b=-1$ $\qquad \boxed{a+b=0}$

②
$y=x^2-1 \to y'=2x$ $\qquad 2x(-2x)=-1 \to x=\pm\frac{1}{2} \to y=\frac{1}{4}-1=\frac{3}{4}$

$-\frac{3}{4}\times 2=-\frac{3}{2}$

③
$\dfrac{6+12}{\frac{2/5+0/5}{3}}=6 \to 6x-9=y$ $\qquad f(x)=\dfrac{a}{2x-1} \to f'(x)=\dfrac{-a\times 2}{(2x-1)^2}=6$ $\Big\}$ $a=-3(2x-1)^2=\dfrac{(6x-9)(2x-1)}{2x-3}$

$\llcorner\ 6x-9=\dfrac{a}{2x-1}$

$-4x^2+4x-1=4x^2-8x+3 \to 8x^2-12x+4=0 \to x=1, \cancel{\frac{1}{2}} \to a=-3$

$f(a) \to \dfrac{-3}{10-1}=-\dfrac{1}{3}$

④
$y=\dfrac{x+a}{ax+1}$ ($x+a \to 1+a$, $ax+1 \to 1+a$) $\to \dfrac{(1+a)-a(1+a)}{(1+a)^2}=2 \to a=\cancel{1}, -\frac{1}{3}$

$y=\dfrac{x-\frac{1}{3}}{-\frac{1}{3}x+1}=1 \to y=2x+b \to 1=2+b \to b=-1$

⑤
$\frac{3}{2}\sin x=\sin x+\frac{1}{2}\cos x \to \sin x=\cos x \to_{x\in[0,\pi]} x=\frac{\pi}{4} \to f(x)=\frac{3\sqrt{2}}{4}$

$f'(x)=\cos x-\frac{1}{2}\sin x \xrightarrow{x=\frac{\pi}{4}} \frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{4}=\frac{\sqrt{2}}{4}$ $\qquad y=\frac{\sqrt{2}}{4}x+b$ $\quad \frac{\pi}{4}$ $\quad \frac{3\sqrt{2}}{4}$ $\quad \frac{-\pi\sqrt{2}}{16}+\frac{3\sqrt{2}}{4}$

$\frac{\sqrt{2}}{4}x=\frac{\pi\sqrt{2}}{16}-\frac{3\sqrt{2}}{4} \to x=\frac{\pi}{4}-3$

⑥
$f'(x)=6x^2-6x-12 \to 6(x-2)(x+1) \to A=(2,-19)\ B(-1,8) \to m_{AB}=-\frac{27}{3}=-9$

$\to 6x^2-6x-12=-9 \to 2x^2-2x-1 \xrightarrow[\Delta>0]{} \underline{2\ \text{نقطه}}$ دو جواب

⑦
$y'=3kx^2+2(k+1)x \to y''=6kx+2(k+1) \to 0=6kx+2k+2$

$-2 / (6x+2)\cancel{k}$

$\to 1$

$-2$

(سارا امینی‌راد)

**۸**

$y' = 3x^2 + 2ax + b \xrightarrow{x=-1} y' = 3 - 2a + b = 0$

$\xrightarrow{x=-1} y = -1 + a - b - 1 = -2 + a - b = -4$

$\begin{cases} -2a + b = -3 \\ a - b = -2 \end{cases} \Rightarrow a = 5 ,\ b = 7 \Rightarrow \dfrac{a}{b} = \dfrac{5}{7}$

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**۹**

$f'(x) = 3x^2 + 2ax + b$
$0 = f'(x) \leftarrow x = 0$ $\Big\}\ b = 0$

$f'(x) = x(3x + 2a) \rightarrow -\dfrac{2a}{3}$

$\underset{0}{f(x)} = \left(-\dfrac{2a}{3}\right)^3 + a\left(-\dfrac{2a}{3}\right)^2 + 4 \longrightarrow a = -3 \qquad \dfrac{-2(-3)}{3} = (2)$

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**۱۰**

$f'(x) = 4x^3 - 12x \longrightarrow 4x(x^2 - 3)$

$\quad \hookrightarrow f'' = 12x^2 - 12 \longrightarrow x = \pm 1$ نقاط عطف

| $-\sqrt{3}$ | | $0$ | | $\sqrt{3}$ | |
|---|---|---|---|---|---|
| $-$ | $+$ | | $-$ | | $+$ |
| ↘ | ↗ | | ↘ | | ↗ |

$A(\sqrt{3}, -4)$ $\quad B(-\sqrt{3}, -4)$ $\quad m_{AB} = 0$

$C(1, 0)$ $\quad D(-1, 0)$

خطوط یکدیگر را قطع X درایم صفر وقتی روی هم بیاندازیم.