سارینا عابدینی

۱-

$$f'(x) = -8\sin 2x \cos^2 2x + 2ax \longrightarrow \lim_{x\to 0^-} \frac{-8\sin 2x\cos^2 2x + 2ax}{x}$$

$$\xrightarrow{\text{hop}} \lim_{x\to 0^-} \frac{-2(2\cos 2x\cos^2 2x + 8\sin 2x\cos 2x(-2\sin 2x)) + 2a}{1} = 2$$

$$\hookrightarrow (-2)(2) + 2a = 2 \quad a = 3$$

$$\lim_{x\to 0^+} \frac{\tan x}{x} = \lim_{x\to 0^+} \frac{\cos^2 x + a\sin x + b}{x} = 0 \longrightarrow \cos^2 0 + b = 0 \longrightarrow b = -1$$

$$a + b = 2$$

۲-

$$y = x^2 - 1 \longrightarrow y' = 2x \longrightarrow 2x(-2x) = -1 \longrightarrow 4x^2 = 1 \begin{cases} x = \frac{1}{2} \\ x = -\frac{1}{2} \end{cases}$$

$$\downarrow x = \pm\frac{1}{2}$$

$$y = \frac{1}{4} - 1 = -\frac{3}{4} \longrightarrow -\frac{3}{4} - \frac{3}{4} = -\frac{3}{2}$$

۳-

$$m = \frac{8+12}{110+10} = 2 \longrightarrow y = 8x - 9$$

$$f(x) = \frac{9}{2x-1} = 8x - 9 \longrightarrow a = (8x-9)(2x-1)$$

$$f'(x) = \frac{-2a}{(2x-1)^2} = 8 \longrightarrow a = -2(4x^2 - 4x + 1)$$

$$-16x^2 + 16x - 2 = 8x - 9 \longrightarrow x = 1 \text{ و } a = -2 \longrightarrow f(3) = \frac{-2}{9} = -\frac{1}{2}$$

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۴-

$y = 2x + 6 \xrightarrow{\text{مشتق}} y' = 2$

$y = \frac{x+a}{ax+1} \xrightarrow{\text{مشتق}} y' = \frac{(ax+1) - a(x+a)}{(ax+1)^2} = \frac{1-a^2}{(1+ax)^2}$ $\quad x=1$

$2 = \frac{1-a}{1+a} \longrightarrow a = -\frac{1}{2}$ ، $y = \frac{x-\frac{1}{2}}{1-\frac{x}{2}} \xrightarrow{x=1} y=1 \rightarrow 2+b=1 \rightarrow b=-1$

۵-

$g(x) = f(x) \rightarrow \frac{2}{2}\sin x = \sin x + \frac{1}{2}\cos x \rightarrow \sin x = \cos x \rightarrow x = \frac{\pi}{4}$

$f'(x) = \cos x - \frac{1}{2}\sin x \longrightarrow f'(\frac{\pi}{4}) = \frac{\sqrt{2}}{4}$ ، $f(\frac{\pi}{4}) = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{4} = \frac{3\sqrt{2}}{4}$

$\frac{\sqrt{2}}{4}x - \frac{\sqrt{2}\pi}{8} + \frac{3\sqrt{2}}{4} = 0 \rightarrow x = \frac{\pi}{4}$

۶-

$f'(x) = 6x^2 - 4x - 12 = 0 \begin{cases} x=1 \longrightarrow (-1, 8) \\ x=2 \longrightarrow (2, -4) \end{cases} \rightarrow m_{AB} = \frac{-12}{3} = -4$

$f'(x) > 0 \rightarrow 6x^2 - 4x - 3 > 0 \rightarrow \Delta = 36 + 72 = 108 \rightarrow$ دو نقطه

$\Delta > 0$

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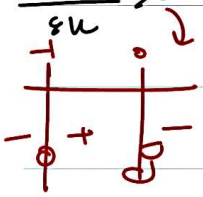
$f'(x)=4x^2-4x-12=0 \begin{cases} x=2 \\ x=-1 \end{cases}$ ، $f''(x)=6kx+2k+2>0 \rightarrow x>-\frac{2k+2}{6k}$

$\frac{2k+2}{6k}>0$



$\rightarrow k\in(-\infty,-1)$ ①

$(\frac{-2k-2}{6k})(\frac{6+6k}{6})>0 \rightarrow$

$\rightarrow k\in(-1,0)$ ②

$I\cap II=\emptyset$

۸-

$(-1)^3+a(-1)^2-b-1=3 \rightarrow a-b=-1$

$x=\frac{-a}{3} \rightarrow -1=\frac{-a}{3} \rightarrow a=3 \rightarrow b=5 \rightarrow \frac{a}{b}=\frac{3}{5}$

۹-

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

$f'(x)=3x^2+2ax=0 \rightarrow x=\frac{-2a}{3} \rightarrow f(\frac{-2a}{3})=0$

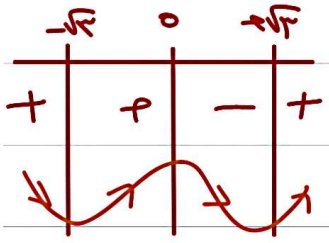
$\rightarrow(\frac{-2a}{3})^3+a(\frac{-2a}{3})^2+c=0 \rightarrow a=-3 \rightarrow \frac{-2a}{3}=2$

$c=4$

۱۰-

$f'(x)=4x^2-12x \rightarrow f'(x)=0 \rightarrow x\in\{-\sqrt{3},0,\sqrt{3}\}$

$f''(x)=12x^2-12 \rightarrow f''(x)=0 \rightarrow x\in\{\pm 1\}$



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

$C(1,0), D(-1,0) \rightarrow m_{CD}=0 \rightarrow \theta=0$