①

$f'(0)=0 \rightarrow \underbrace{3\times\cos^2(2x)\times 2\times(-\sin(2x))}_{k} + 2a$ $\quad f(0)=0$

$f''(0)=2 \rightarrow k' + 2a = 2$

$1+0+b=0$

$\boxed{b=-1}$

$k' \rightarrow$ مشتق $\rightarrow$ ~~$12\times(\cdots)$~~ $-12 + 2a = 2 \rightarrow 2a = 14 \rightarrow \boxed{a=7}$

$a+b = 7-1 = 6$

②

$d \Rightarrow y=k \quad y=x^2-1 \quad x^2-1$ $\quad (\alpha, \alpha^2-1)$

(β, β^2-1) ← نقاط مشترک

$y' = 2x \rightarrow 2\alpha\times 2\beta = -1$

$4\alpha\beta = -1$

$x^2-1=k \rightarrow x^2-1-k=0 \rightarrow \alpha\beta = -1-k = \frac{-1}{4}$

$\rightarrow -k = \frac{-1}{4}+1 = \frac{3}{4} \rightarrow \boxed{k=-\frac{3}{4}}$

مجموع عرض‌ها:

$(-\frac{3}{4})+(-\frac{3}{4}) = -\frac{6}{4} = -\frac{3}{2}$

$\boxed{-1.5}$

③

$(-\frac{1}{2}, -12), (\frac{5}{2}, 4) \quad m = \frac{4-(-12)}{\frac{5}{2}+\frac{1}{2}} = \frac{16}{3}$ ④ $\rightarrow y = \frac{9}{2m-1}$

$f'(x) = \frac{-2(a)}{(2(x)-1)^2} = 4$ $\quad f(a) = \frac{-3}{9} = \frac{-1}{3}$

$12m^2 - 24m + 9 - 9 = 0$

$\Delta = 0 \rightarrow$

$\boxed{a=-3} \leftarrow 12 = 9-a$

④

$y = 2x+b \quad y = \frac{x+a}{ax+1} \quad (1,4)$

$2x+b = \frac{x+a}{ax+1} \xrightarrow{x=1} 2+b = \frac{1+a}{a+1} \rightarrow 2+b = \frac{2}{2} = 1 \rightarrow 2+b=1 \rightarrow \boxed{b=-1}$

$2 = \frac{1-a^2}{(ax+1)^2} \rightarrow 2 = \frac{(1+a)(1-a)}{(a+1)^2 a^2} \Rightarrow 2a+2 = 1-a$

$3a = -1 \rightarrow a = -\frac{1}{3}$

$a-b \Rightarrow -\frac{1}{3} - (-1) = \frac{2}{3}$

⑤

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

$f'(x) \rightarrow \cos x - \frac{1}{2}\sin x$

$x = \frac{\pi}{4}$ ← $(\frac{\pi}{4}, \frac{\sqrt{2}}{4})$

$\rightarrow \frac{\sqrt{2}}{2} - \frac{1}{2}\left(\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{4}$

$y - \frac{\sqrt{2}}{4} = \frac{\sqrt{2}}{4}\left(x - \frac{\pi}{4}\right) \xrightarrow{y=0} -\frac{\sqrt{2}}{4} = \frac{\sqrt{2}}{4}\left(x - \frac{\pi}{4}\right)$

$-2 = x - \frac{\pi}{4} \leftarrow x = -2 + \frac{\pi}{4}$

۷

$2x^3 - 2x^2 - 12x + 1 = f(x)$ ext: $-b$ ۲ $m_{AB}: \frac{-19-1}{2+1} = \frac{-20}{3}$ ⑨

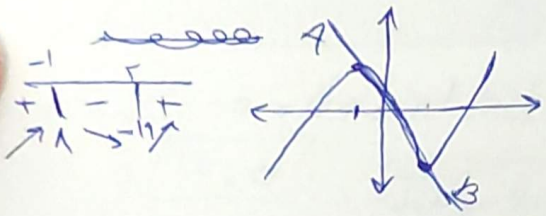
$(-1,1), (2,-19)$

$f'(x) = 6x^2 - 4x - 12 = 0$

$-1, 2 \leftarrow x^2 - x - 2 = 0$

$6x^2 - 4x - 12 = 0 \rightarrow 3x^2 - 2x - 6 = 0$

۲ ریشه دارد پس ۲ نقطه وجود دارد



۷

$y = kx^3 + (k+1)x^2$

$y' = 3kx^2 + 2(k+1)x$

$y' = 6kx + 4k + 2 = 0$

$x = \frac{-4k-2}{6k}$

$x = \frac{-2k-1}{3k} > 0$

$\frac{-1}{3} \quad 0$

$-1 \quad +$

II

$y = k\left(\frac{-2k-1}{3k}\right)^3 + (k+1)\left(\frac{-2k-1}{3k}\right)^2 > 0$

$\frac{2(k+1)^3}{27k^2} > 0$

$-1 \quad 0$

$+ \quad - \quad +$

I

I ∩ II = $k > -1$

۸

$y = x^3 + ax^2 + bx - 1 \quad (-1, -3)$

$-3 = 1 + a - b - 1 \rightarrow a - b = -2 \rightarrow a = b - 2$

$y' = 3x^2 + 2ax + b \xrightarrow{x=-1} 3 - 2a + b = 3 - 2(b-2) + b = 7 - b$

خط مماس در -1 $\rightarrow y - y_0 = 7 - b(x+1) - 3$

۹

$f(x) = x^4 + ax^3 + bx^2 + cx + d \rightarrow f'(x) = 4x^3 + 3ax^2 + 2bx + c = 0 \xrightarrow{x=0} c = 0$

$4x^3 + 3ax^2 = 0$

$x^2(4x + 3a) = 0$

$x = \frac{-3a}{4}$

$f(x) = x^4 + ax^3 + 4 = 0$

$\left(\frac{-3a}{4}\right)^4 + a\left(\frac{-3a}{4}\right)^3 + 4 = 0$

$\frac{81a^4}{256} - \frac{27a^4}{64} + 4 = 0 \rightarrow -\frac{27a^4}{256} = -4 \rightarrow a^4 = 256 \rightarrow a = \pm 4$

طول min نسبی: $\frac{-3(-4)}{4} = 3$

۱۰

$f(x) = x^4 - 6x^2 + 5 \rightarrow f'(x) = 4x^3 - 12x = 0 \rightarrow f''(x) = 12x^2 - 12 = 0$

$x^2 = 1 \quad (1,0) \quad (0,5) \quad (-1,0)$

$4x(x^2 - 3) = 0$

$x = 0, \pm\sqrt{3}$

$(+\sqrt{3}, -4) \quad (-\sqrt{3}, -4)$

$1 \rightarrow 1 - 6 + 5 = 0$

$-1 \rightarrow 1 - 6 + 5 = 0$

$0 \rightarrow 5$

$+\sqrt{3} \rightarrow 9 - 6(3) + 5 = -4$ ④

$-\sqrt{3} \rightarrow 9 - 6(3) + 5 = -4$ ④

min

$m = 0 \rightarrow$ خط افقی

$m = 0 \rightarrow$ خط افقی

زاویه: صفر

تعداد خط افقی