السیاه جان کمری

①

$\lim_{x\to 0^+} \frac{f(x)}{x} = 0 \rightarrow f(0^+) = 0$ مطلق

$\cos^2(2x) + ax^2 + b = 0 \qquad 1 + b = 0 \qquad \boxed{b = -1}$

$\lim_{x\to 0^-} \frac{f'(x)}{x} = 2$

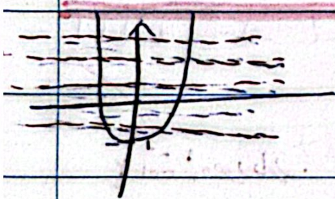
$f'(0^-) = 2x \qquad 2\cos(2x) \times 2 - \sin 2x + 2ax = 2x$

$2a = 2$

$a = \frac{1}{2}$

$\frac{1}{2} - 1 = \frac{-1}{2}$

②



$x^2 - 1 = k \qquad x^2 = k+1 \qquad x = \pm\sqrt{k+1}$

مماس های رسم شده بر هم عمودند ⇐ شیب در نقاط قرینه و معکوس یکدیگر اند

$y' = 2x \qquad 2\sqrt{k+1} = \frac{1}{2\sqrt{k+1}} \qquad k+1 = \frac{1}{4} \qquad \boxed{k = -\frac{3}{4}}$

$x_1 = \sqrt{1 - \frac{3}{4}} \qquad x_2 = -\sqrt{1-\frac{3}{4}} \qquad \boxed{x_1, x_2 = \pm\frac{1}{2}}$

③

$m = \frac{\Delta y}{\Delta x} = \frac{6+12}{2/5+0/5} = 6 \qquad f(x) = \frac{a}{2x-1} \qquad f'(x) = \frac{a \times -2}{(2x-1)^2}$

$\frac{-2a}{(2x-1)^2} = 6 \qquad a = -3(2x-1)^2 \qquad f(5) = \frac{-3 \times (2x-1)^2}{(2x-1)} = \boxed{-27}$