(۱)

$f(-1) = 0$

$1 + b = 0$

$\Rightarrow b = -1$

$f'(-1) = 0$

$\lim_{x \to 0} \frac{f(x)}{x} \overset{\text{hop}}{=} \lim_{x \to 0} f''(x) = 2$

$f''(0) = 2a = 2 \Rightarrow a = 1$

$a + b = 0$

(۲)

$f'(m) \cdot f'(-m) = -1$

$2m \cdot (-2m) = -1$

$\Rightarrow 4m^2 = 1$

$\Rightarrow m = \pm 1$

$f(1) = 0$

$a + 0 = 0$

(۳)

$m = \frac{4 + 12}{2,5 + \frac{1}{2}}$

$4 + 12 = 4(m + \frac{1}{2})$

$y = 4x - 9$

$4x - 9 = \frac{a}{2x - 1}$

$8x^2 - 4x - 9 = a$

$12x^2 - 48x + 36 = 0$

$\Delta = 48^2 - 4 \times 12 \times 36 = 0$

$\Rightarrow a = -4$

$f(0) = \frac{-4}{-10} = \frac{2}{5}$

(۴)

$\frac{1+a}{a+1} = 2 + b \Rightarrow b = -1$

$\frac{x+a}{a x + 1} = 2x - 1$

$2ax^2 + (-a+1)x - 1 - a = 0$

$\Delta = 0 \quad a^2 - 2a + 1 + 8a + 16a^2 = 0$

$\Rightarrow 25a^2 + 6a + 1 = 0$

$\Rightarrow a = -\frac{1}{5}$

$a - b = \frac{2}{5}$

(۵)

$\frac{1}{2} \sin x = \sin x + \frac{1}{2} \cos x$

$\Rightarrow \sin x = \cos x \Rightarrow x = \frac{\pi}{4}$

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

$f'(\frac{\pi}{4}) = \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{4} = \frac{\sqrt{2}}{4}$

$f(\frac{\pi}{4}) = \frac{2\sqrt{2}}{4}$

$(y - \frac{2\sqrt{2}}{4}) = \frac{\sqrt{2}}{4}(x - \frac{\pi}{4})$

$\xrightarrow{y=0} x = \frac{\pi - 4}{\sqrt{2}}$

(۶)

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

$\Rightarrow x = \begin{cases} -1 \Rightarrow f(-1) = 8 \\ 2 \Rightarrow f(2) = -16 \end{cases}$

$m = \frac{-16 - 8}{2 + 1} = -8$

$4x^2 - 4x - 12 = -8$

$\Rightarrow 4x^2 - 4x - 4 = 0$

$\Delta > 0$

۲ نقطه

(٧)

$f'(x) = 4kx^3 + 2(k+1)x$

$f''(x) = 12kx^2 + 2k + 2 = 0$

$\Rightarrow x = \frac{-k-1}{6k} < 0$

	$-\infty$		0		$+\infty$
	$-$	0	$+$	0	$+$

(٨)

$-4 = -1 + a - b + 1$

$\Rightarrow a - b = -2$

$f'(x) = 4x^3 + 2ax + b$

$f''(x) = 12x^2 + 2a$

$0 = 2a + 6$

$\Rightarrow a = -3$

$\Rightarrow b = 1$

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

(٩)

$f(0) = c = 3$

$f'(x) = 4x^3 + 2ax + b$

$f'(0) = b = 0$

$f\left(\frac{-1}{2}\right) = \frac{1}{2} = 1$

$f(x) = x^4 + \frac{a}{2}x^2 + 3 = 1 \Rightarrow a = -4 = \frac{-\sqrt{2}}{2}$