



2014年工学部第3問

 数理  
石井

 3  $a, b$  を実数とし,  $f(x) = (ax + b \cos x) \sin x$  とおく. 関数  $f(x)$  が

$$f'(0) = 2, \quad \int_0^{\frac{\pi}{2}} f(x) dx = 4$$

 をみたすとき,  $a, b$  の値を求めなさい.

$$f'(x) = (a - b \sin x) \sin x + (ax + b \cos x) \cdot \cos x$$

$$\therefore f'(0) = b = 2 \quad \therefore b = 2$$

$$\begin{aligned} \int_0^{\frac{\pi}{2}} (ax + 2 \cos x) \sin x dx &= \int_0^{\frac{\pi}{2}} ax(-\cos x)' + \sin 2x dx \\ &= \left[ -ax \cos x \right]_0^{\frac{\pi}{2}} - \int_0^{\frac{\pi}{2}} -a \cos x dx + \left[ -\frac{1}{2} \cos 2x \right]_0^{\frac{\pi}{2}} \\ &= \left[ a \sin x \right]_0^{\frac{\pi}{2}} + \frac{1}{2} + \frac{1}{2} \\ &= a + 1 \end{aligned}$$

$$\therefore a + 1 = 4 \quad \therefore a = 3$$

$$\therefore \underline{a = 3, b = 2} //$$