< 三角多項式の係数 1 >

例　2 次の三角多項式

$$f(t) = a_0 + a_1 \cos t + b_1 \sin t + a_2 \cos(2t) + b_2 \sin(2t)$$

に対し，8 ページの公式から

$$(1)\ \int_{-\pi}^{\pi} f(t)dt = a_0 \times \int_{-\pi}^{\pi} 1dt + a_1 \times \int_{-\pi}^{\pi} \cos t dt + b_1 \times \int_{-\pi}^{\pi} \sin t dt + a_2 \times \int_{-\pi}^{\pi} \cos(2t)dt$$

$$+ b_2 \times \int_{-\pi}^{\pi} \sin(2t)dt$$

$$= a_0 \times 2\pi + a_1 \times 0 + b_1 \times 0 + a_2 \times 0 + b_2 \times 0 = 2\pi a_0$$

$$(2)\ \int_{-\pi}^{\pi} f(t)\cos(2t)dt = \quad a_0 \times \int_{-\pi}^{\pi} \cos(2t)dt + a_1 \times \int_{-\pi}^{\pi} \cos t \cos(2t)dt + b_1 \times \int_{-\pi}^{\pi} \sin t \cos(2t)dt$$

$$+ a_2 \times \int_{-\pi}^{\pi} \cos^2(2t)dt + b_2 \times \int_{-\pi}^{\pi} \sin(2t)\cos(2t)dt$$

$$= a_0 \times 0 + a_1 \times 0 + b_1 \times 0 + a_2 \times \pi + b_2 \times 0 = \ \pi a_2$$

問　例と同じ $f(t)$ に対し，次の定積分を求めよ。

$(1) \int_{-\pi}^{\pi} f(t)\cos t dt =$

$(2) \int_{-\pi}^{\pi} f(t)\sin t dt =$

$(3) \int_{-\pi}^{\pi} f(t)\sin(2t)dt =$

$(4) \int_{-\pi}^{\pi} f(t)\cos(3t)dt =$

$(5) \int_{-\pi}^{\pi} f(t)\sin(3t)dt =$