

## 積分練習問題

$$\begin{aligned}(1) \quad & \int_0^1 (x^6 + x^4) dx \\ &= \left[ \frac{1}{7} x^7 + \frac{1}{5} x^5 \right]_0^1 \\ &= \left( \frac{1}{7} + \frac{1}{5} \right) - \left( \frac{1}{7} \cdot 0 + \frac{1}{5} \cdot 0 \right) \\ &= \frac{12}{35}\end{aligned}$$

$$\begin{aligned}(2) \quad & \int_0^{\frac{\pi}{6}} \sin \left( 2x + \frac{\pi}{6} \right) dx \\ &= \left[ -\frac{1}{2} \cos \left( 2x + \frac{\pi}{6} \right) \right]_0^{\frac{\pi}{6}} \\ &= \left( -\frac{1}{2} \cos \frac{3\pi}{6} \right) - \left( -\frac{1}{2} \cos \frac{\pi}{6} \right) \\ &= \frac{1}{2}\end{aligned}$$

$$\begin{aligned}(3) \quad & \int_4^6 \frac{dx}{x^2 - 2x - 3} \\ &= \int_4^6 \frac{dx}{(x-3)(x+1)} \\ &= \int_4^6 \frac{1}{2} \left( \frac{1}{x-3} - \frac{1}{x+1} \right) dx \\ &= \frac{1}{2} [\log(x-3) - \log(x+1)]_4^6 \\ &= \log 3 - \frac{1}{2} \log 5\end{aligned}$$

$$(4) \int_e^{e^2} \log x \, dx$$

$$= [x \log x - x]_e^{e^2}$$

$$= (e^2 \log e^2 - e^2) - (\log e - e)$$

$$= e^2 + e - 1$$

$$(5) \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sin^2 \theta \, d\theta$$

$$= \int \frac{1 - \cos 2\theta}{2} \, d\theta$$

$$= \frac{1}{2} \theta - \frac{1}{4} \sin 2\theta + C \quad (C \text{は積分定数})$$