

3 次の定積分を計算せよ。(Hint : $\sin^n x$, $\cos^n x$ は奇関数 or 偶関数?)

(1) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos^7 x \, dx$

(2) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^8 x \, dx$

(3) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^9 x \, dx$

4 次の定積分を計算せよ。

(1) $\int_{-1}^1 \frac{x+1}{(x^2+2x+2)^2} \, dx$

(2) $\int_0^2 xe^{x^2} \, dx$

(3) $\int_0^{\frac{\pi}{2}} \sin^3 x \cos x \, dx$

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3 (1) $\frac{32}{35}$ (2) $\frac{35}{128}\pi$ (3) 0 4 (1) $\frac{1}{2} \int_1^5 u^{-2} \, du = \frac{2}{5}$ [$u = x^2 + 2x + 2$]

(2) $\frac{1}{2} \int_0^4 e^u \, du = \frac{1}{2}(e^4 - 1)$ [$u = x^2$] (3) $\int_0^1 u^3 \, du = \frac{1}{4}$ [$u = \sin x$]