

習題集 11

(對應 [張旭微積分](#) 積分前篇重點十一：四大積分基本方法之三：分部積分法)

1. Show that if $n \in \mathbb{N}$, then $\int_0^{2\pi} x \sin nx dx = -\frac{2\pi}{n}$.
2. Find $\int x \cos x dx$.
3. Find $\int x \sin^{-1}(x^2) dx$.
4. Find $\int x \sin^{-1} x dx$. [本題有難度]
5. Find $\int x \tan^{-1} x dx$.
6. Find $\int_0^1 x^3 e^{x^2} dx$.
7. Find $\int_0^1 \ln(x^2 + 2) dx$.
8. Prove that $\int x^n \ln x dx = \frac{x^{n+1}}{(n+1)^2} [(n+1) \ln x - 1] + C$ for $n \neq -1$.
9. Prove that $\int x^n e^{ax} dx = \frac{1}{a} x^n e^{ax} - \frac{n}{a} \int x^{n-1} e^{ax} dx$.
10. Find $\int \frac{x e^x dx}{(1+x)^2}$.