(61) $\int x^n \sin x dx = -x^n \cos x + n\int x^{n-1} \cos x dx$

Proof

Let $u = x^n$ $v = -\cos x$

$du = nx^{n-1}dx$ $dv = \sin x dx$

$\therefore \int x^n \sin x dx = -x^n \cos x + n\int x^{n-1} \cos x dx$

Q.E.D.

(63) $\int x^n \ln x dx = \frac{x^{n+1}}{(n+1)^2}\left[(n+1)\ln x - 1\right] + C$

Proof

Let $u = \ln x$ $v = \frac{1}{(n+1)} x^{n+!}$

$du = \frac{1}{x}$ $dv = x^n dx$

$\therefore \int x^n \ln x dx = \frac{1}{(n+1)} x^{n+1} \ln x - \frac{1}{(n+1)} \int x^n dx$

$-\frac{1}{(n+1)} \int x^n dx = -\frac{1}{(n+1)}\left\{\frac{1}{(n+1)} x^{n+1}\right\} + C = -\frac{1}{(n+1)^2} x^{n+!} + C$

$\therefore \int x^n \ln x dx = \frac{1}{(n+1)} x^{n+1} \ln x - \frac{1}{(n+1)^2} x^{n+!} + C = \frac{x^{n+1}}{(n+1)^2}\left[(n+1)\ln x - 1\right] + C$

Q.E.D.