The Unknown Integral

By Parts $\int u\,dv = uv - \int v\,du$

$$\int e^x \cos x\,dx = e^x \sin x - \int \sin x\, e^x\,dx$$

$u = e^x \quad dv = \cos x$

$du = e^x dx \quad v = \sin x$

$u = e^x \quad dv = \sin x\,dx$

$du = e^x dx \quad v = -\cos x$

$$\int e^x \cos x\,dx = e^x \sin x - \left[e^x(-\cos x) - \int (-\cos x)\, e^x dx \right]$$

$$\int e^x \cos x\,dx = e^x \sin x + e^x \cos x - \int e^x \cos x\,dx$$

$+\int e^x \cos x\,dx$ $\qquad$ $+\int e^x \cos x\,dx$

$$2\int e^x \cos x\,dx = e^x \sin x + e^x \cos x$$

$$\frac{2\int e^x \cos x\,dx}{2} = \frac{e^x \sin x + e^x \cos x}{2}$$

$$\boxed{\int e^x \cos x\,dx = \frac{e^x \sin x + e^x \cos x}{2}}$$

$$\int x^2 e^x\,dx = x^2 e^x - \int e^x (2x)\,dx$$

$u = x^2 \quad dv = e^x dx$

$du = 2x\,dx \quad v = e^x$

$u = 2x \quad dv = e^x dx$

$du = 2\,dx \quad v = e^x dx$

$$= x^2 e^x - \left(2x e^x - \int e^x 2\,dx \right)$$

$$= x^2 e^x - 2x e^x + 2\int e^x dx$$

$$= \boxed{x^2 e^x - 2x e^x + 2e^x}$$

$\int x^2 e^x dx$ using tabular Method

Derivative		Integral
x^2	+	e^x
$2x$	−	e^x
2	+	e^x
0		e^x

$$\boxed{x^2 e^x - 2x e^x + 2e^x}$$