

Integration by Parts

$$\int u \frac{dv}{dx} dx = uv - \int v \frac{du}{dx} dx$$

Example Find $\int xe^x dx$.

Example Find $\int x \cos x dx$.

Example Find $\int \ln x dx$.

Example

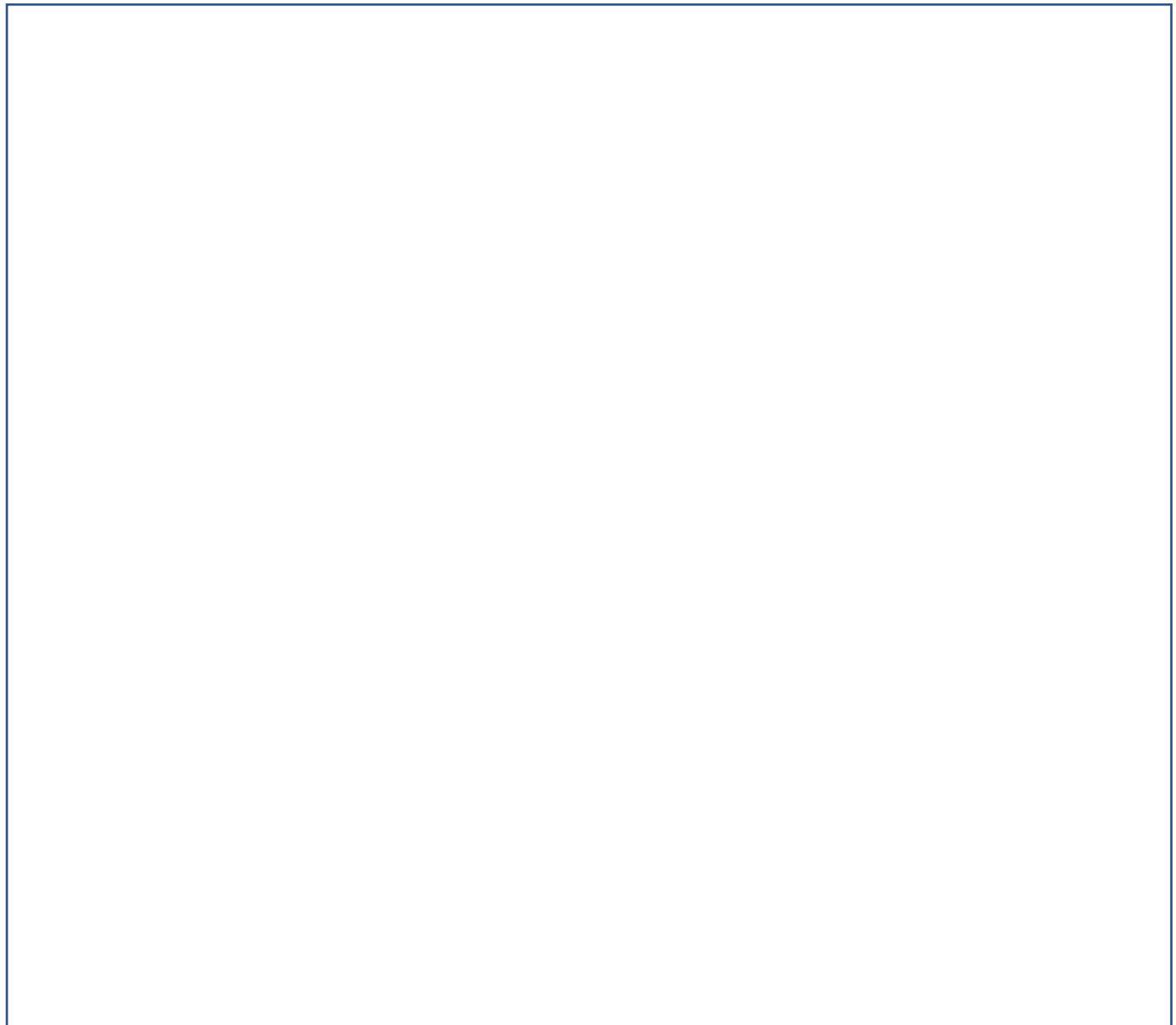
Find $\int x^2 e^{2x} dx$.

Example

Find $I = \int e^x \sin x dx$.



Example Find $I = \int_0^1 x(x-1)^3 dx$ (definite integral)



Reduction Formula

Example If $I_n = \int x^n e^{-x} dx$ evaluate I_3 .

Example

If $I_n = \int_0^{\frac{\pi}{2}} \sin^n x \, dx$, show that $I_n = \frac{n-1}{n} I_{n-2}$ for $n \geq 2$.

Hence find (a.) I_5 and (b.) I_6

Example

Use the identity $\sec^2 A \equiv 1 + \tan^2 A$ to find a reduction formula for

$$I_n = \int_0^{\frac{\pi}{4}} \tan^n x \, dx$$

Hence, evaluate (a.) $\int_0^{\frac{\pi}{4}} \tan^5 x \, dx$ and (b.) $\int_0^{\frac{\pi}{4}} \tan^6 x \, dx$

