

example

integration points

integration by parts

example

Suppose we have the integrand xe^x and set $u = x$, $v' = 1 \implies u' = 1$, $v = e^x$

We now can calculate the integral as follows:

$$\begin{aligned}\int xe^x dx &= \int uv' dx \\ &= uv - \int u'v dx \\ &= xe^x - \int e^x dx \\ &= xe^x - e^x + C = e^x(x - 1) + C\end{aligned}$$

Use product rule for differentiation to check the result:

$$\begin{aligned}\frac{d}{dx}[e^x(x - 1)] &= \frac{d}{dx}[e^x] \cdot (x - 1) + e^x \cdot \frac{d}{dx}[x - 1] \\ &= \frac{d}{dx}[e^x(x - 1)] = e^x x - e^x + e^x = e^x x\end{aligned}$$

integration by parts

exercise 5

Evaluate $\int_0^1 x e^x dx$

