

Integration by Parts

Recall the product rule for derivatives

$$\frac{d}{dx} [f(x) \cdot g(x)]$$

But this means that

Examples: Find the following antiderivatives:

1) $\int x \cos x dx$

$$2) \int x^2 e^x dx$$

$$3) \int \ln x dx$$

$$4) \int \frac{xe^x}{(x+1)^2} dx$$

$$5) \int e^x \cos x dx$$

Integration by parts for a definite integral:

Example: Evaluate the following definite integrals

1) $\int_1^e x^3 (\ln x)^2 dx$

$$2) \int_0^1 (x-3)e^{3x} dx$$

Example (page 489 #41): Sales of the latest recording by Britannia, a British rock group are currently $2te^{-0.1t}$ per week (each unit representing 10 000 CDs), where t denotes the number of weeks since the recording's release. Find an expression that gives the total number of CDs sold as a function of t .