## **Integration by Parts**

Recall the product rule for derivatives

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

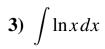
But this means that

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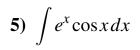
Examples: Find the following antiderivatives:

1) 
$$\int x \cos x dx$$





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



**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 Brittania, 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*.