Chapter 8. **Techniques of integration**
Section 8.1 **Integration by parts**

The **formula for integration by parts for indefinite integrals** is

$$\int u(x)v'(x)dx = u(x)v(x) - \int u'(x)v(x)dx$$

The **formula for integration by parts for definite integrals** is

$$\int_a^b u(x)v'(x)dx = u(x)v(x)]_a^b - \int_a^b u'(x)v(x)dx$$

Example 1. Find the integral.

1. $\int x \cos 3x \ dx$

2. $\int \ln x \ dx$

3. $\int_0^1 (t^2 + 2t + 3)e^t dt$

4. $\int \sin^{-1} x \; dx$

5. $\int e^x \cos x \; dx$

Example 2. Use the methods of cylindrical shells to find the volume of a solid generated by rotating the region bounded by $y = e^{-x}$, $y = 0$, $x = -1$, $x = 0$ about $x = 1$.