# Lecture 7
# 7.1 Integration by Parts

## Product Rule

$$\frac{d}{dx}\left(f(x)\cdot g(x)\right) = f'(x)\cdot g(x) + f(x)\cdot g'(x)$$

By integrating formula for the Product Rule

$$\int \left(f'(x)\cdot g(x) + f(x)\cdot g'(x)\right)dx = f(x)\cdot g(x)$$

## Formulas for Integrating by Parts

$$\int udv = u \cdot v - \int vdu$$

where $u = f(x)$, $v = g(x)$ and $du = f'(x)dx$, $dv = g'(x)dx$.

For Definite Integrals

$$\int_a^b f(x) \cdot g'(x)dx = f(x) \cdot g(x)\Big|_a^b - \int g'(x) \cdot f(x)dx$$