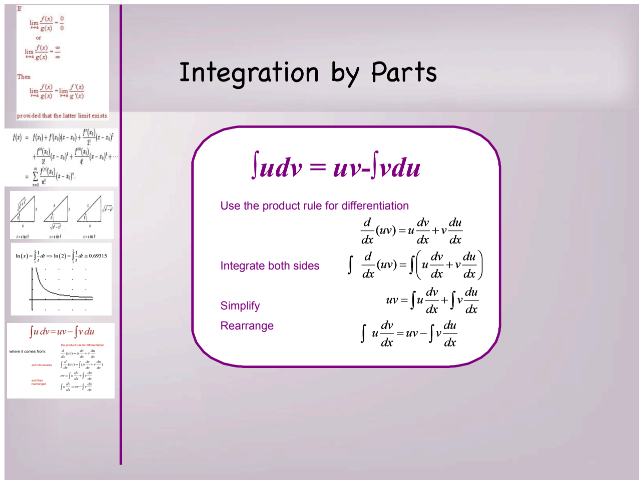

$$\int udv = uv - \int vdu$$

Use the product rule for differentiation

$$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$$

Integrate both sides

$$\int \frac{d}{dx}(uv) = \int\left(u\frac{dv}{dx} + v\frac{du}{dx}\right)$$

Simplify

$$uv = \int u\frac{dv}{dx} + \int v\frac{du}{dx}$$

Rearrange

$$\int u\frac{dv}{dx} = uv - \int v\frac{du}{dx}$$

Integration by Parts

Look at the Product Rule for Differentiation.

$$D_x[u(x)v(x)] = u'(x)v(x) + v'(x)u(x)$$

EX 1 $\int x\sin(2x)\,dx$

EX 2 $\int \arctan(5x)\,dx$

EX 3 $\int \frac{\ln x}{\sqrt{x}}\,dx$

Repeated Integration by Parts

EX 4 $\int x^3 e^x dx$

EX 5 $\int e^x \cos x \, dx$