

# Integration by Parts & The Tabular Method

## section 6.1

Integration by Parts:  $\int f(x) \cdot g'(x) dx = f(x)g(x) - \int f'(x)g(x) dx$

Or

with a definite integral:  $\int_a^b f(x) \cdot g'(x) dx = f(x)g(x)|_a^b - \int_a^b f'(x)g(x) dx$

Alternative (WebWork) Notation:

$$\int u dv = uv - \int v du$$

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

### Key Things about the Tabular Method:

- You never **have** to have the Tabular Method – it's just another way to write the Integration by Parts formula when you have to do Integration by Parts **multiple** times.
- Use the Tabular Method when  $f(x) = x^n$ , where  $n > 1$  is some positive integer.
- Make sure the chart is set up correctly. The first row always has the labels – no functions.
- Be sure to read across the rows correctly – over then drop.
- Know when to stop the chart!

### Examples:

1.  $\int x^3 e^{5x} dx$

2.  $\int x^5 \cos(x/2) dx$

3.  $\int e^{2x} \sin x dx$