

Math 16B
Kouba
Integration by Parts Formula

RECALL: (Product Rule) $D\{f(x)g(x)\} = f(x)g'(x) + f'(x)g(x) \longrightarrow$

$$f(x)g'(x) = D\{f(x)g(x)\} - f'(x)g(x) \longrightarrow$$

$$f(x)g'(x) = D\{f(x)g(x)\} - g(x)f'(x) \longrightarrow$$

$$\int f(x)g'(x) dx = \int D\{f(x)g(x)\} dx - \int g(x)f'(x) dx \longrightarrow$$

$$\int f(x)g'(x) dx = f(x)g(x) - \int g(x)f'(x)dx \longrightarrow$$

$\left(\text{Let } u = f(x) \longrightarrow^D du = f'(x) dx \text{ and let } v = g(x) \longrightarrow^D dv = g'(x) dx \right) \longrightarrow$

(INTEGRATION by PARTS)

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