

7.1 Integration by Parts

Integration by parts is another substitution method requiring two substitution variables instead of one. The formula for Integration by Parts is given below, but is best explained using several examples. (Derivation of the formula is done in class.)

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

or,

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

Example 1 Evaluate the integral: $\int 5x \cos(x) dx$.

Example 2 Evaluate the integral $\int x^2 e^x dx$

Example 3 Evaluate $\int e^x \sin(x) dx$

Example 4 Find the antiderivative of $\ln(x)$.

Example 5 Evaluate $\int_5^1 \sqrt{x} \ln(x^3) dx$

Example 6 Evaluate $\int \sin^{-1}(5x) dx$

Example 7 Evaluate $\int_0^1 \frac{r^3}{\sqrt{4+r^2}} dr$