

February 21, 2007

Sec. 7.1, Problem #17

$$\int x^2 e^{2x} dx$$

$$u = x^2 \quad dv = e^{2x} dx$$

$$du = 2x dx \quad v = \frac{1}{2} e^{2x}$$

$$\int x^2 e^{2x} dx = \frac{1}{2} x^2 e^{2x} - \int x e^{2x} dx$$

$$u = x \quad dv = e^{2x} dx$$

$$du = dx \quad v = \frac{1}{2} e^{2x}$$

$$\frac{1}{2} x^2 e^{2x} - \int x e^{2x} dx = \frac{1}{2} x^2 e^{2x} - \left[ \frac{1}{2} x e^{2x} - \frac{1}{2} \int e^{2x} dx \right]$$

$$= \frac{1}{2} x^2 e^{2x} - \frac{1}{2} x e^{2x} + \frac{1}{2} \int e^{2x} dx$$

$$= \frac{1}{2} x^2 e^{2x} - \frac{1}{2} x e^{2x} + \frac{1}{2} \left( \frac{1}{2} e^{2x} \right) + C = \frac{1}{2} x^2 e^{2x} - \frac{1}{2} x e^{2x} + \frac{1}{4} e^{2x} + C$$

Extra #6

$$\int x^2 \ln x dx$$

$$u = \ln x \quad dv = x^2 dx$$

$$du = \frac{1}{x} dx \quad v = \frac{1}{3} x^3$$

$$\int x^2 \ln x dx = \frac{1}{3} x^3 \ln x - \int \frac{1}{3} x^3 \left( \frac{1}{x} \right) dx = \frac{1}{3} x^3 \ln x - \frac{1}{3} \int x^2 dx$$

$$= \frac{1}{3} x^3 \ln x - \frac{1}{3} \left( \frac{1}{3} x^3 \right) + C = \frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C$$