

Solutions to Sample Exam 3

$$\underline{1} \quad \int 9x e^{4x} dx$$

$$= 9 \int x e^{4x} dx$$

$$u = x$$

$$du = dx$$

$$dv = e^{4x} dx$$

$$v = \frac{e^{4x}}{4}$$

$$= 9 \left[x \frac{e^{4x}}{4} - \int \frac{e^{4x}}{4} dx \right]$$

$$= 9 \left[\frac{x e^{4x}}{4} - \frac{1}{4} \int e^{4x} dx \right]$$

$$= \left(9 \left[\frac{x e^{4x}}{4} - \frac{1}{16} e^{4x} \right] + C \right)$$

$$\underline{2} \quad \int 10x \ln(2x) dx$$

$$= 10 \int x \ln(2x) dx$$

$$u = \ln(2x)$$

$$du = \frac{1}{2x} \cdot 2 = \frac{1}{x} dx$$

$$dv = x dx$$

$$v = \frac{x^2}{2}$$

$$= 10 \left[\frac{x^2}{2} \ln(2x) - \int \frac{x^2}{2} \cdot \frac{1}{x} dx \right]$$

$$= 10 \left[\frac{x^2}{2} \ln(2x) - \frac{1}{2} \int x dx \right]$$

$$= 10 \left[\frac{x^2}{2} \ln(2x) - \frac{x^2}{4} \right] + C$$

$$= \left(5x^2 \ln(2x) - \frac{5}{2} x^2 + C \right)$$