

Integration by Parts Practice 1

1. $u = x^2$
 $dv = e^{2x} dx$

2. $u = (\ln x)^2$
 $dv = dx$

3. $u = x$
 $dv = \sec^2 x dx$

4. $u = x^2$
 $dv = \cos x dx$

5. $\int x^3 \ln x dx$ $u = \ln x$ $dv = x^3$
 $du = \frac{1}{x} dx$ $v = \frac{1}{4} x^4$

$$(\ln x) \left(\frac{1}{4} x^4 \right) - \int \frac{1}{4} x^4 \cdot \frac{1}{x} dx$$

$$\frac{1}{4} x^4 \ln x - \int \frac{1}{4} x^3 dx$$

$$\boxed{\frac{1}{4} x^4 \ln x - \frac{1}{16} x^4 + C}$$

6. $\int (4x+7) e^x dx$ $u = 4x+7$ $dv = e^x dx$
 $du = 4 dx$ $v = e^x$

$$(4x+7) e^x - \int e^x \cdot 4 dx$$

$$\boxed{(4x+7) e^x - 4e^x + C}$$

7. $\int x \sin 3x dx$ $u = x$ $dv = \sin 3x dx$
 $du = dx$ $v = -\frac{1}{3} \cos 3x$

$$-\frac{1}{3} x \cos 3x - \int -\frac{1}{3} \cos 3x dx$$

$$\boxed{-\frac{1}{3} x \cos 3x + \frac{1}{9} \sin 3x + C}$$

$$8. \int x^2 \ln x \, dx \quad u = \ln x \quad dv = x^2 \, dx$$

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

$$\ln x \cdot \frac{1}{3} x^3 - \int \frac{1}{3} x^3 \cdot \frac{1}{x} \, dx$$

$$\frac{1}{3} x^3 \ln x - \int \frac{1}{3} x^2 \, dx$$

$$\boxed{\frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C}$$

$$9. \int x \cos 2x \, dx \quad u = x \quad dv = \cos 2x \, dx$$

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

$$x \cdot \frac{1}{2} \sin 2x - \int \frac{1}{2} \sin 2x \, dx$$

$$\boxed{\frac{1}{2} x \sin 2x + \frac{1}{4} \cos 2x + C}$$

$$10. \int x \ln x \, dx \quad u = \ln x \quad dv = x \, dx$$

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

$$\ln x \cdot \frac{1}{2} x^2 - \int \frac{1}{2} x^2 \cdot \frac{1}{x} \, dx$$

$$\frac{1}{2} x^2 \ln x - \int \frac{1}{2} x \, dx$$

$$\boxed{\frac{1}{2} x^2 \ln x - \frac{1}{4} x^2 + C}$$