Week 13 Homework: Part 2

Justin Hink

1)

$$\int \sin(x)\cos(x)\,dx = -\cos(x)\cos(x) - \int[-\cos(x)\,(-\sin(x))]dx$$

$$\int \sin(x)\cos(x)\,dx = -cos^2(x) - \int \sin(x)\cos(x)\,dx$$

$$2\int \sin(x)\cos(x)\,dx = -cos^2(x)$$

$$\int \sin(x)\cos(x)\,dx = \frac{-cos^2(x)}{2} + C$$

2)

$$\int x^2e^x dx = x^2e^x - \int 2xe^x dx$$

$$= x^2e^x - 2[xe^x - \int e^x dx]$$

$$= x^2e^x - 2[xe^x - e^x] + C$$

$$= x^2e^x - 2xe^x + 2e^x + C$$

3)

$$\frac{d}{dx}(xcos(x)) = \left(\frac{d}{dx}x\right)\cos(x) + x(\frac{d}{dx}\cos(x))$$

$$= \cos(x) + x(\frac{d}{dx}\cos(x))$$

$$= \cos(x) + x(-\sin(x))$$

$$= \cos(x) - x\sin(x)$$

4)

$$\frac{d}{dx}(e^{x^4}), let\ u = x^4$$

$$= e^{x^4}\ \frac{d}{dx}(x^4)$$

$$= 4e^{x^4}x^3$$