Math 1172 Homework #5

Section 7.1 # 7, 10, 25, 26

7.1 #7

$$\int x \sin 10x \, dx$$

$u = x$ $\qquad du = dx$

$dv = \sin 10x$ $\qquad v = \frac{-1}{10}\cos 10x$

$$uv - \int v\,du = x \cdot \frac{-1}{10}\cos 10x - \int \frac{-1}{10}\cos 10x \cdot dx$$

$$= -\frac{1}{10} x\cos 10x + \frac{1}{10}\int \cos 10x \, dx$$

$$= -\frac{1}{10} x\cos 10x + \frac{1}{10} \cdot \frac{1}{10}\sin 10x + C$$

7.1 # 10

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

$u = \ln x$ $\qquad du = \frac{1}{x}dx$

$dv = x^{-2}$ $\qquad v = -x^{-1}$

$$uv - \int v\,du = \ln x \cdot -x^{-1} - \int -x^{-1} \cdot \frac{1}{x} dx$$

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

$$= -x^{-1}\ln x - x^{-1} + C$$

#25

$$\int z^3 e^z \, dz \qquad u = z^3 \quad du = 3z^2 \, dz \qquad dv = e^z \, dz \quad v = e^z$$

$$uv - \int v \, du = z^3 \cdot e^z - \int e^z \cdot 3z^2 \, dz$$

$$= z^3 e^z - 3 \int z^2 e^z \, dz \qquad u = z^2 \quad du = 2z \, dz \qquad dv = e^z \, dz \quad v = e^z$$

$$= z^3 e^z - 3\left(z^2 e^z - \int e^z \cdot 2z \, dz \right)$$

$$= z^3 e^z - 3\left(z^2 e^z - 2 \int z e^z \, dz \right) \qquad u = z \quad du = dz \qquad dv = e^z dz \quad v = e^z$$

$$= z^3 e^z - 3\left(z^2 e^z - 2\left(z e^z - \int e^z \, dz \right)\right)$$

$$= z^3 e^z - 3\left(z^2 e^z - 2\left(z e^z - e^z \right)\right) + C$$

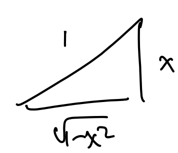
#26

$$\int (\arcsin x)^2 \, dx \qquad u = (\arcsin x)^2 \quad du = 2\arcsin x \cdot \frac{1}{\sqrt{1-x^2}} \, dx \qquad dv = dx \quad v = x$$

$$= x(\arcsin x)^2 - \int x \cdot 2\arcsin x \cdot \frac{1}{\sqrt{1-x^2}} \, dx \qquad t = \arcsin x \quad x = \sin t \qquad dt = \frac{1}{\sqrt{1-x^2}} \, dx$$

$$= x(\arcsin x)^2 - 2 \int \sin t \cdot t \cdot dt \qquad u = t \quad du = dt \qquad dv = \sin t \quad v = -\cos t$$

$$= x(\arcsin x)^2 - 2\left(t \cdot -\cos t - \int -\cos t \, dt \right)$$



$$= x(\arcsin x)^2 - 2\left(-t\cos t + \sin t \right) + C$$

$$= x(\arcsin x)^2 - 2\left(-\arcsin x \cdot \cos(\arcsin x) + \sin(\arcsin x)\right) + C$$

$$= x(\arcsin x)^2 - 2\left(\arcsin x \cdot \sqrt{1-x^2} + x\right) + C$$