Math 1172 Homework #4

Section 6.4* #26, 50
Section 6.6 #35, 64

6.4* #26

$$g(x) = x\sin(2^x)$$

$$g'(x) = x\cdot\cos(2^x)\cdot 2^x\ln 2 + \sin(2^x)\cdot 1$$

#50

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

$u = 2^x+1$

$du = 2^x\ln 2\,dx$

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

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

$$= \frac{1}{\ln 2}\int \frac{1}{u}\,du = \frac{1}{\ln 2}\ln|u| + C = \frac{1}{\ln 2}\ln\left|2^x+1\right| + C$$

Section 6.6 #35

$$y = x\sin^{-1}x + \sqrt{1-x^2}$$

$$y' = x\cdot\frac{1}{\sqrt{1-x^2}} + \sin^{-1}x\cdot 1 + \frac{1}{2}(1-x^2)^{-1/2}\cdot 2x$$

#64

$$\int_0^{\sqrt{3}/4} \frac{dx}{1+16x^2} = \int_0^{\sqrt{3}/4} \frac{dx}{1+(4x)^2}\,dx$$

$u = 4x$

$du = 4\,dx$

$$= \int \frac{dx}{1+u^2} \cdot \frac{1}{4}\,du = \frac{1}{4}\tan^{-1} u$$

$$= \frac{1}{4}\tan^{-1}(4x)\Big|_0^{\sqrt{3}/4} = \frac{1}{4}\tan^{-1}\sqrt{3} - \frac{1}{4}\tan^{-1} 0$$

$$= \frac{1}{4}\frac{\pi}{3} - 0 = \pi/12$$