Math 1172

Homework #4

6.4* #9a/86, #50

6.6 #19, #62/64

6.4* #9a/86

$$\log_{10} 40 + \log_{10} 2.5 = \log_{10}(40 \cdot 2.5)$$

$$= \log_{10}(100) = 2 \qquad (\text{since } 10^2 = 100)$$

6.4* #50

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

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

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

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

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

$$= \frac{1}{\ln 2}\ln|2^x + 1| + C$$

6.6 #19 $\frac{d}{dx}(\cot^{-1}x)$

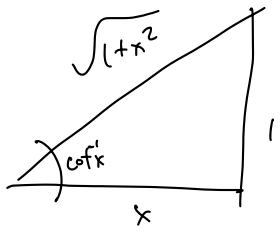
$y = \cot^{-1}x$

$\cot y = x$

(deriv. both sides) $-\csc^2 y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = -\frac{1}{\csc^2 y} = -\sin^2 y$

$= -(\sin(\cot^{-1}x))^2$



$= -\left(\frac{1}{\sqrt{1+x^2}}\right)^2 = \frac{-1}{1+x^2}$ Sleeve

6.6 # 62/64

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

$u = 4x$

$du = 4\,dx$

$\frac{1}{4}du = dx$

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

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

$= \frac{1}{4}\tan^{-1}(\sqrt{3}) - \frac{1}{4}\tan^{-1}(0)$

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