Math 1172 HW #5

Section 6.6 #19, 71

Section 6.8 #50

Section 7.1 #58

6.6 #19

$\frac{d}{dx} \cot^{-1} x$

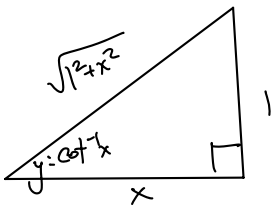
$y = \cot^{-1} x$

$\cot y = x$

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

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

$\cot = \frac{\text{adj}}{\text{opp}} = \frac{x}{1}$



$\frac{dy}{dx} = -\sin^2 y = -\left(\frac{1}{\sqrt{1+x^2}}\right)^2$

$$\boxed{\frac{dy}{dx} = \frac{-1}{1+x^2}}$$

6.6 #71

$\int \frac{t^2}{\sqrt{1-t^6}}\, dt$

$u = t^3$

$du = 3t^2 dt$

$= \frac{1}{3}\int \frac{1}{\sqrt{1-u^2}} \cdot du = \frac{1}{3}\sin^{-1}(u) + C$

$= \frac{1}{3}\sin^{-1}(t^3) + C$

6.8 #50 $\lim_{x \to \pi/2^-} \cos x \sec 5x$

$= \lim_{x \to \pi/2^-} \frac{\cos x}{\cos(5x)} \to \frac{\cos \pi/2}{\cos 5\pi/2} = \frac{0}{0}$

$\overset{H}{=} \lim_{x \to \pi/2^-} \frac{-\sin x}{-\sin(5x) \cdot 5} = \frac{-1}{-1 \cdot 5} = \boxed{\frac{1}{5}}$

7.1 #58 $\int x^n e^x \, dx$

$u = x^n \quad du = nx^{n-1} \, dx$

$dv = e^x dx \quad v = e^x$

$= x^n e^x - \int e^x \cdot n x^{n-1} \, dx$

$= x^n e^n - n \int x^{n-1} e^x \, dx$