Homework 6 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Due Friday, September 30

(a) Explain why $\lim_{x\to 0} \frac{\cos x - 1}{x} = 0$. (You can use the fact that $\lim_{x\to 0} \frac{\sin x}{x} = 1$.)

(b) What is the chain rule?

(c) Stewart, Ch. 3.4, 7-36, 47-54, 59-60; even required, odd recommended.

(d) What is the relation between $\frac{dy}{dx}$ and $\frac{dx}{dy}$?

(e) Find $\frac{dy}{dx}$ if $x^2 + y^2 = 1$. First, answer in terms of both x and y, and then give an answer only in terms of x.

(f) Stewart, Ch. 3.5, 1-4.

(g) Find $\frac{dy}{dx}$ if (a) $y = \sin^{-1} x$, and (b) $y = \tan^{-1} x$.

(h) Stewart, Ch. 3.5, 5-20; odd recommended, even required.

(i) Stewart, Ch. 3.5, 27-30, 40-41, 43.

(j) If $y = \ln x$, explain why $\frac{dy}{dx} = \frac{1}{x}$.

(k) Find $\frac{dy}{dx}$ if $y = \log_a x$.

(l) Explain why $e = \lim_{x\to 0}(1+x)^{1/x}$.

(m) Explain why $e = \lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n$.

(n) Stewart, Ch. 3.6, 1.

(o) Stewart, Ch. 3.6, 2-16; odd recommended, even required.

(p) Stewart, Ch. 3.6, 37-42; odd recommended, even required.

(q) Stewart, Ch. 3.6, 49, 50.