Math 220. Lab 5. Fall 2007
Mastery Exam Practice
Lab 5 Problems

(1) Compute the derivative of $f(x) = x^2 - 5$ using the definition of the derivative.

(2) Find an equation of the tangent line to the curve $y = x^2 + \ln(x)$ at the point where $x = 1$.

(3) (a) If $\log_{10}(16) = 1.204$, what is an approximate value of $10^{0.301}$?
(b) Find $\sec(\frac{\pi}{3})$.

(4) Let $f(x) = e^{(x-1)} + 5$.
(a) Find a formula for $f^{-1}$.
(b) What is the domain of $f^{-1}$? Explain.

(5) Find the derivative of $f(x) = \ln(4x^2) \sin(x)$.

(6) Find the derivative of $f(x) = x^2 + 5e^{(\sin(x)+x^7)}$.

(7) Find the derivative of $f(x) = \frac{5\cos(x) + 3^x}{2x}$.

(8) Sketch a graph of $g(x) = 2\sin(x + \pi/2) - 1$. Indicate the scale on both the $x$ and $y$ axes.

(9) Suppose that $f$ is a function with derivative $f'(x) = x^2(x - 1)$.
(a) Determine the set of points $x$ on which $f$ is increasing.
(b) Find all the stationary points of the function $f$.
(c) Which of the stationary points are maximum, minimum, or neither? Explain.

(10) Find the equation of the tangent line to $x^2y^2 + x^2 + y^2 = 9$ at the point $(2,1)$.

(11) If a car is 5 miles from home and is travelling at 35 mph as it begins to accelerate at a rate of 0.01 miles per hour squared, how far is he from home an hour later?