Name:_____

Test 2
Fall 2006
MATH 121 Section 02
October 6, 2006

Directions : You have 50 minutes to complete all 5 problems on this exam. There are a possible 100 points to be earned. You may not use your book, notes, or any graphing/programmable calculator. Please be sure to show all pertinent work. *An incorrect answer with no work will receive no credit!* If any portion of the exam is unclear please come to me and I will elaborate provided I can do so without giving away the problem.

1. (20 points)
   Compute the derivatives of the following functions:

   (a) $f(x) = (x^2 + \sin(x))^{323}$

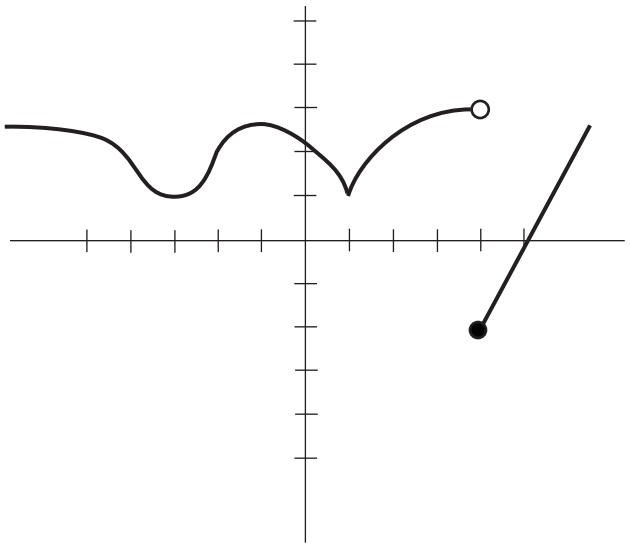
   (b) $g(x) = \sin(x)\cos(2x)$

   (c) $q(x) = x^2/(x^2+1)$

   (d) $F(x) = 5 + \sqrt{\sin(\sin(x))}$.

2. (20 points)
Let $r(x) = f(g(h(x)))$, where $h(1) = 2$, $g(2) = 3$, $h'(1) = 4$, $g'(2) = 5$, and $f'(3) = 0$. Find $r'(1)$.

3. (20 points)
Below is the graph of a function $f(x)$. Sketch the graph of the function $f'(x)$ where defined. If $f'(x)$ is not defined everywhere tell me where it is undefined and why it is undefined there.



4. (20 points)
Compute the equation of the tangent line to the curve given by the equation

$$x^2 + y^2 = 2x + 4y + 5$$

at the point $(0, 5)$.

5. (20 points)
Assume that oil spilled from a ruptured tanker spreads in a circular pattern whose radius increases at a constant rate of 2 ft/sec. How fast is the area of the spill increasing when the radius of the spill is 60 ft?