Math 20A
Midterm Exam 2
November 20, 2012

Version A

Instructions
1. No calculators or other electronic devices are allowed during this exam.
2. You may use one page of notes, but no books or other assistance during this exam.
3. Write your Name, PID, and Section on the front of your Blue Book.
4. Write the Version of your exam at the top of the page on the front of your Blue Book.
5. Write your solutions clearly in your Blue Book
   (a) Carefully indicate the number and letter of each question and question part.
   (b) Present your answers in the same order they appear in the exam.
   (c) Start each question on a new side of a page.
6. Read each question carefully, and answer each question completely.
7. Show all of your work; no credit will be given for unsupported answers.

0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard.

1. (6 points) Find the derivatives of:
   (a) \( f(x) = \ln(\sin(x) + 2) \)
   (b) \( f(x) = (\cos(x) + 2)^2 \)

2. (6 points) If \( g(x) + 2x \sin(g(x)) = x^2 \) and \( g(1) = 0 \), find \( g'(1) \).

3. (6 points) Let \( f(x) = x^3 + 6x^2 + 9x + 1 \).
   (a) Find and classify all of the critical points of \( f(x) \).
   (b) Find the global maximum and global minimum of \( f(x) \) on the interval \([-2, 0]\).

4. (3 points) Compute \( \lim_{x \to \infty} x^3 e^{-2x^2} \).

5. (6 points) The total volume of a Truffula Tree after \( t \) years is given by \( V(t) = \pi t h \), where \( h \) is the height of the tree, which changes over time. The surface area of a Truffula Tree is given by \( A(t) = \frac{\pi}{2} h \). Currently, for a ten-year old Truffula Tree, the measured rate of change of its volume is 200 \( \text{ft}^3/\text{yr} \), and the measured rate of change of its surface area is 1 \( \text{ft}^2/\text{yr} \). How high is the Truffula Tree?