Math 20A
Midterm Exam 2
November 20, 2012
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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) $f(x) = (\cos(x) + 2)^x$

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 ft^3/yr, and the measured rate of change of its surface area is 1 ft^2/yr. How high is the Truffula Tree?