Math 114 Fall 2005

BONUS Quiz **4** — Experienced Calculus I

Name: _____

Date: _____
Time Begun: _____
Time Ended: _____

Math 114
Friday, October 14, 2005
Ron Buckmire
Angela Gallegos

Topic: Another related rates problem

This bonus quiz is intended as another opportunity for you to illustrate your understanding of the application of differentiation to compute related rates of change.

Reality Check:

EXPECTED SCORE : _____**/10** ACTUAL SCORE : _____**/10**

Instructions:

0. Before you open the quiz, look at the hint at `http://faculty.oxy.edu/ron/math/114/05/quiz.html`
1. Once you open the quiz, **you have 30 minutes to complete it**.
2. You may not use your text or any other source, including course materials. You may use a calculator. You must work alone. Do not discuss the contents of this quiz with anyone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy or borrow one. **UNSTAPLED PAPERS WILL NOT BE GRADED**.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution.
6. **This bonus quiz is due on Monday, October 17**, at the beginning of class. NO LATE QUIZZES WILL BE ACCEPTED.

Pledge: I, _____, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

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SHOW ALL YOUR WORK

1. *(10 points total)* The number n of neurons in a human brain is related to the alcohol level a (both of these are function of age t) by the equation

$$na^2 + n^2 e^a = \text{constant}.$$

If at a certain age, someone has an alcohol level of zero but is increasing their alcohol level at a rate of 2 grams per month, what is the *relative* rate of change of the number of neurons in their brain?

NOTE: the *relative* rate of change of n is defined to be $\dfrac{1}{n}\dfrac{dn}{dt}$.