

Quiz 9

EXPERIENCED CALCULUS I

Name: \_\_\_\_\_

Math 114

Date: \_\_\_\_\_

Friday, November 11, 2005

Time Begun: \_\_\_\_\_

Ron Buckmire

Time Ended: \_\_\_\_\_

Angela Gallegos

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**Topic:** Qualitative Analysis of Rate Equations

This quiz is intended to provide you with an opportunity to illustrate your facility with analyzing rate equations to obtain sketches of solutions which have reasonable behavior proscribed by the nature of the specific rate equation.

**Reality Check:**

EXPECTED SCORE : \_\_\_\_\_/10

ACTUAL SCORE : \_\_\_\_\_/10

**Instructions:**

0. Before you open the quiz, check the course website or Blackboard for a hint.
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 quiz is due on Monday, November 14,** 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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1. Consider the rate equation:  $y' = (y - 2)^3(y + 1)^2$ .

a. (1 point) Show that  $y'' = (y - 2)^5(y + 1)^3(5y - 1)$

b. (2 points). Write down for which values of  $y$  the solution  $y(t)$  is increasing and for which values of  $y$  the solution is decreasing.

c. (2 points). Write down for which values of  $y$  the solution  $y(t)$  is concave up and for which values of  $y$  the solution is concave down.

2. (5 points). Using information from above, draw sketches of solutions  $y(t)$  of the rate equation  $y' = (y - 2)^3(y + 1)^2$  which start at the following initial conditions: (A)  $y(0) = 3$ , (B)  $y(0) = 2$ , (C)  $y(0) = 1$  and (D)  $y(0) = 0$ , and (E)  $y(0) = -1$ , (F)  $y(0) = -2$ . Clearly indicate equilibrium values and inflection values.