

Quiz 2

EXPERIENCED CALCULUS I

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

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

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

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

Math 114

Friday, September 9, 2005

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**Topic:** Population Model

This quiz is intended to illuminate your understanding of mathematical models.

**Reality Check:**

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

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

**Instructions:**

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, September 12**, 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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**EXPLAIN YOUR ANSWERS**

1. (*10 points*). Let  $P = P(t)$  be a function which represents the size of some population at time  $t$ . Consider the differential equation  $P' = 0.017P$ . This rate equation is an example of a “population growth model.” **Write at least one sentence in response to each of the following questions.**
- a. Why is this name appropriate for the model?
- b. Translate into English the mathematical statement of the model.
- c. Write down an assumption upon which the model is based.
- d. What is unrealistic about the results that the model would produce?
- e. What type of function must  $P(t)$  be to satisfy the equation  $P'(t) = 0.017P(t)$ ? (For example  $\cos(t)$  is known as a *trigonometric* function.) NOTE: you are not being asked to explicitly write down an expression for  $P(t)$ , but you are being asked to describe what kind of function  $P(t)$  must be.