BONUS Quiz 1

Topic: Population Model and Euler’s Method

This quiz is intended to illustrate your understanding of Euler’s Method.

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 bonus 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.
SHOW ALL YOUR WORK

1. (10 points). Consider the initial value problem $P' = kP, P(0) = A$. Your goal is to obtain an accurate approximation of $P(T)$, the approximate value of $P(t)$ when $t = T > 0$.

   a. Obtain an approximation for $P(T)$ using Euler’s Method with one time step. (Factor your answer!)

   b. Obtain an approximation for $P(T)$ using Euler’s Method with two time steps. (Factor your answer!)

   c. Show that an approximation for $P(T)$ using Euler’s Method with three time steps is $A \left(1 + \frac{KT}{3}\right)^3$

   d. Write down an expression for $P(T)$ using Euler’s Method with $N$ steps. What do you think happens to $P(T)$ as $N \to \infty$?