QUIZ 5

Numerical Analysis

Name: ______________________________

Date: ____________________

Time Begun: ____________________

Time Ended: ____________________

Friday October 1

Ron Buckmire

Topic : Appreciating Quadratic Convergence

The idea behind this quiz is for you togive you an opportunity to demonstrate your understanding of the relative rates of convergence of functions, grow more familiar with $\mathcal{O}$ and o notation, and to practice your ability to find limits.

Reality Check:

EXPECTED SCORE : __________**/10** ACTUAL SCORE : __________**/10**

Instructions:

1. Once you open the quiz, you have as much time as you need to complete it, but record your start time and end time at the top of this sheet.
2. You may use the book or any of your class notes. You must work alone.
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 one.
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. Relax and enjoy...
7. **This quiz is due on Monday October 4**, in 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.

1. (a.) (*3 points*). Show that for any positive integer k, the sequence defined by $p_n = \dfrac{1}{n^k}$ converges **linearly** to $p_\infty = 0$.

(b.) (*1 point.*) For each pair of integers k and m determine a number N for which $|\dfrac{1}{N^k} - 0| < 10^{-m}$

2. (*4 points*) Show that $q_n = \dfrac{1}{10^{\alpha^n}}$ has an asymptotic rate of convergence of α! (In other words, if $\alpha = 3$, the sequence will be cubically convergent, etc.)

(b.) (*2 points*) Which element of the sequence $r_n = \dfrac{1}{10^{3^n}}$ will be within 10^{-12} of its limit?