

Name: _____

ID#: _____

Test # 2(practice)

MAT 127 Spring 2005

Directions: There are 4 questions. You have 1 hour. For credit, you must show all your work, using the backs of the pages if necessary. You may not use a calculator.

1. _____/25 2. _____/25 3. _____/25 4. _____/25

Total Score. _____/100

1. Let k and K be positive constants. Assume the function $y(t)$ satisfies the initial value problem

$$\frac{dy}{dt} = ky \left(1 - \frac{y}{K}\right) \quad y(0) = 10.$$

- (a) If $K = 100$ and $y(\ln(9/2)) = 50$ find the solution to the initial value problem.
(b) If $k = 1/2$ and $y(2 \cdot \ln(6/5)) = 8$ find the solution to the initial value problem.
(c) Assume the conditions in part (b). When will $y(t) = 6$? When will $y(t) = 4$? Explain your answer to the latter question.

2. Consider the sequence whose n^{th} term is $a_n = n/(n + 4)$.
- (a) Show that the sequence is increasing.
 - (b) Assume the sequence converges and compute its limit.

3. Compute the limits of the following convergent sequences:

(a) $\left\{ \frac{1 \cdot 3 \cdot 5 \cdots (2n-1)}{(2n)^n} \right\}$

(b) $\{\ln(n + 1) - \ln(n)\}$

4. Compute the limit of the following convergent sequence: (Hint: Use the fact that if $\lim_{n \rightarrow \infty} a_n = L$ then, obviously, $\lim_{n \rightarrow \infty} a_{n+1} = L$, as well).

$$\left\{ \sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \dots \right\}$$