MA 367-01 §5.5 – 6.1	**Quiz #3**	*score*	**Name:** ______________ **10 February 2003**

INSTRUCTIONS: Turn in solutions to the following problems by Friday (14 February 2003) in class. As usual, fully explain your solutions and calculate the numerical values (when appropriate).

1. Show that
$$\left[\binom{n}{0}+\binom{n}{1}+\binom{n}{2}+\cdots+\binom{n}{n}\right]^2=\sum_{k=0}^{2n}\binom{2n}{k}.$$

2. Evaluate
$$\sum_{k=1}^{n}(-1)^k k\binom{n}{k}.$$

3. Enumerate all the permutations of the letters a, b, c, d
   (a) in lexicographic order.
   (b) Since that was so much fun, do it again in a minimum change order this time, i.e., so that each permutation is obtained from its predecessor by interchanging a single pair of letters. Better yet, make the last permutation in the list differ from the first by a single interchange, also.

4. Construct a generating function for a_r, the number of distributions of r identical objects into:
   (a) five different boxes with at most 4 objects in each box;
   (b) four different boxes with between 3 and 8 objects in each box;
   (c) seven different boxes with at least one object in each box.

   You may leave your answers in factored form on this problem.

5. Construct a generating function that could be used to determine how many ways there are to distribute 10 identical balls into 4 different boxes so that the first box has between 2 and 6 balls, the second box has an odd number of balls, and the other two boxes have no more than 6 balls each. The use a computer algebra system to determine the numerical answer.