MA 367-01 §5.3 – 5.4	**Quiz #2**	*score*	**Name:** _____ **31 January 2003**

INSTRUCTIONS: Turn in solutions to the following problems by Wednesday (5 February 2003) in class. Fully explain your solutions and calculate the numerical values.

1. In how many ways can 15 identical pieces of candy be distributed to 4 children
   (a) with no restrictions?
   (b) so that each child gets at least 2 pieces of candy?
   (c) in addition, so that no child gets more than 8?
2. Find the number of integer solutions to the equation $x_1 + x_2 + x_3 + x_4 = 2$ where $x_i \geq -5$ for each i.
3. A downtown area consists of a large square area that is 10 blocks by 10 blocks in size. If a car starts at the southwest corner and ends at the northeast corner traveling only east and north, how may different routes are possible that involve 4 or fewer turns?
4. Let D and R be sets with $|D| = k$ and $|K| = n$.
   (a) How many functions are there from D to R ($f : D \to R$)?
   (b) How many such functions are injective (one-to-one)? Be sure to address all cases for n and k.
   (c) How many such functions are surjective (onto)? OK, this problem is too difficult right now, so let's settle for counting this in the special case that $k = 5$ and $n = 2$. The let $n = 3$ and count them again.
5. How many ways can 10 identical pieces of candy be placed in 3 identical bags? One way to do this is to enumerate all the possibilities in some systematic manner. There is no known closed-form formula for the general problem of distributing identical balls into identical boxes, although we can make progress on a recurrence relation and on a generating function that "solves" this kind of problems.