# Math 477, Problems for Chapter 1

1. There are 20 athletes competing. One of them will get a Gold medal, another gets a Silver medal, and a third will get a Bronze medal. How many different outcomes are there?

2. How many ways can you rearrange the following words:

   (a) MISSISSIPPI

   (b) ARRANGE

   (c) NEWJERSEY

   (d) AMERICA

3. Consider a group of 20 people. If everyone shakes hands with everyone else, how many handshakes take place?

4. If 12 people are to be divided into 3 committees of respective sizes 3, 4, and 5, how many divisions are possible?

5. If 8 identical blackboards are to be divided among 4 schools, how many divisions are possible? How many if each school must receive at least 1 blackboard? (This uses a technique commonly referred to as "stars and bars.")

6. How many ways can you place 5 X's and 4 O's in a three by three board, such that each cell gets either an X or an O? (Hard)Out of these, how many of them have neither three X's nor three O's in any row or column?

7. Consider the grid of points shown below. Suppose that, starting at the point labeled A, you can go one step up or one step to the right at each move. This procedure is continued until the point labeled B is reached. How many different paths from A to B are possible?

   Hint: Note that to reach from A to B, you must take 4 steps to the right and 3 steps upward.
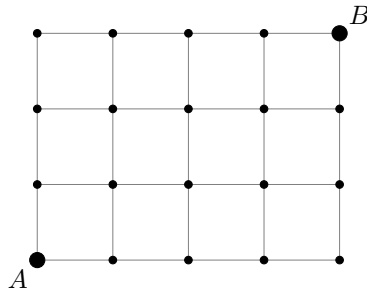
8. In the question above, how many different paths are there from A to B that go through the point circled in the following lattice?