MA 308

Homework #3

Due Tuesday, February 8

1. How many ways can you write a positive integer n as the sum of positive integers, where order matters? Justify your answer. (This problem is discussed in Chapter 1 of the textbook, Cuisenaire Trains. So I am asking you to study the solution and the reasoning and then describe it in your own words.)

2. How many ways can you write a positive integer n as a sum of 1's and 2's, where order matters? Justify your answer. (We already discussed this in class.)

3. Let a_n be the number of ways of writing the positive integer n as a sum of 1's, 2's and 3's, where order matters. Write a formula for a_n in terms of preceding values.

4. Go to the National Library of Virtual Manipulatives, `http://nlvm.usu.edu/en/nav/vlibrary.html`, and then select the Towers of Hanoi problem from Algebra 6–8. Click on Instructions to see the rules of the puzzle. The goal is to move all of the disks from one peg to another in the minimum possible number of moves. Try to find this minimum number for the 1 disk puzzle, then the 2 disk puzzle, then the 3 disk puzzle, and so on. Record these numbers and try to detect a formula, and then try to find a justification for this formula. In particular, think about this: If you already know how to solve the puzzle with $n - 1$ disks, how can you use this to solve the puzzle with n disks?

5. Read Chapter 2 of *Fostering Algebraic Thinking*.