All answers should be as simple as possible.

1. Compute the following sums:

   1a. The odd integers from zero to ten inclusive.

   1b. The odd integers from zero to n inclusive

2. Suppose you flip a pair of pennies repeatedly. The first penny has probability a of heads; the second penny has probability b of heads. On each pair of flips, there is a score of zero if the two pennies give the same results, one if a is heads and b is tails, and minus one if a is tails and b is heads.

   2a. What is the expected value of the sum of the scores from one flip?

   2b. What is the expected value of the variance of the sum of the scores from one flip?

   2c. What is the expected value of the sum of the scores from n flips?

   2d. What is the expected value of the variance of the sum of the scores from n flips?

3. You have a rectangle m units wide and n units tall (as in Figure 3.3 of the text). Consider paths with an initial part consisting of segments going one unit to the right or one unit up, and with final parts consisting of segments going unit to the left or one unit down.

   3a. For a path that starts at the lower right (point 0,0) and ends at the upper left (point m, n), how many segments of each type must it have?

   3b. How many paths are there of the type described in question 3a?

   3c. For a path that starts at the lower right (point 0,0) and ends at the at the same point, what conditions must be true on the number of segments of each type?

   3d. How many paths are there of the type described in question 3c?

4. Simplify

$$\sum_{\substack{0\le i\le m\\ 0\le j\le n}} \binom{i+j}{i}^2.$$

   If you can not complete simplify it, discuss the situation.

5. Write an algorithm for adding two large integers (similar to Algorithm 1.4) with the following properties:
   5a. The first integer has m digits and the second has n digits where $m \ge n$.
   5b. Replace the division(s) of Step 4 of Algorithm 1.4 with a conditional (**If**) statement.
   5c. Unlike Step 3 of Algorithm 1.4, don't add the carry under conditions where it is known to be zero.
   These properties were chosen because they might lead to a faster addition algorithm, depending on the computer.