**CS 2420 Fall 2008**
**Written 4 – 10 Points**
**Due October 13, 2008**

1. Exercise 6.19 of the textbook.
2. Exercise 6.26 of the textbook.
3. Exercise 6.32 of the textbook.
4. Each non-negative integer less than $2^k$ can be represented by a binary sequence of k bits. For example, the integers from 0 to 15 can be represented by 4-bit binary sequences: 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111. Every time I increment an integer, I need to flip a number of bits in the corresponding binary sequence. For example, to increment an integer from 4 to 5, I need to flip one bit to change the corresponding binary sequence from 0100 to 0101; to increment an integer from 11 to 12, I need to flip three bits to change the corresponding binary sequence from 1011 to 1100.

   Now I have a nice observation: To increment an integer from 0 to 1, to 2, and so on eventually to n, the total number of flips is at most 2n.

   a. Write a program to verify the observation for n = 13, 100, and 2420 by counting the total number of flips. For two bonus points, prove that the observation is true for all n > 0.

   b. It is mentioned on page 239 of the textbook that, insertions on binomial queues take constant time on average. Can you use my observation of bit-flips to explain this?

   Submit a single document on eagle or give it to me in class.