Homework 3

ECE 665 Spring 2009
Due March 4

All homework is due at the beginning of class; late submissions will not be accepted. Please work through the entire problem set before writing up your solutions; doing so will ensure that your homework submission is neat, clear and concise.

1. Exercise 6-5.8

2. Suppose that you are a physicist, studying the properties of a new particle you have discovered, called a *squark*. In particular, you wish to know the Coulombic force between a squark and $n-1$ other squarks in a particular setting, where all the particles lie at regular intervals in one dimension. This allows us to label the points from 1 to n such that the distance d_{ij} between particles i and j ($1 \leq i, j \leq n$) is simply $j - i$. The net Coulombic force between a squark j with charge q_j and $n-1$ other squarks with charges $q_1, \ldots, q_{j-1}, q_{j+1}, \ldots q_n$ is

$$F_j = \sum_{i<j} \frac{C q_i q_j}{(j-i)^2} - \sum_{i>j} \frac{C q_i q_j}{(j-i)^2}.$$

   Give an algorithm to compute F_j, for all j. Prove its correctness and derive its running time as a function of n.

3. Exercise 30.1-2

4. Exercise 30.1-7

5. Exercise 16.3-5

6. Exercise 16.3-7

7. Exercise 16.3-8