CISC320 Algorithms, Homework set 5
Due Monday, May 17
Review/Extra Credit problem set

These problems are a good review of the topics of the course. They give you a chance to think about how each of the major algorithm design and analysis strategies apply and to think about one or more algorithms we have studied as they apply to the exercise. While it is good review for everyone to consider these problems and frame your solution in your mind, you are asked to submit a solution for grading only if (1) you think you have a good solution to the problem and (2) would like the extra credit to make up for points lost on an earlier homework.

1. Exercise 1.36 and (c) show square roots modulo p can be computed in $O(n^{2.59})$ time, for an n bit prime p,
2. Exercise 2.9b (polynomial multiplication using fft)
3. Exercise 2.15 (think of decomposition into two phases)
4. Exercise 2.16 (the merits of doubling)
5. Exercise 3.15 (components in directed graphs)
6. Exercise 3.16 (depth in DAGs) (and what happens if there is a requirement of at most 4 CS courses per semester? ... or k courses for given k?)
7. Exercise 3.24 (Rudrata paths in DAGs)
8. Exercise 4.5 (modification of Dijkstra's)
9. Exercise 5.8 (exploring the relationship between MST and shortest paths)
   Remark: 5.9 is a good set of review questions
10. Exercise 5.11 (union-find)
11. Exercise 6.21 (vertex cover on trees via dynamic programming)
12. Exercise 6.22 (subset sum via dynamic programming, also relevance to NP-completeness)
13. Exercise 8.3 (SAT variation)
14. Exercise 8.14 (might the combination of two hard problems be easier?)