CMPUT 204 — Problem Set 5

Topics covered in Part I are biconnected component and minimum spanning tree; in Part II are Dijkstra's algorithm for single-source shortest paths, Strassen's matrix multiplication algorithm, P & NP concepts, decision problem, and polynomial time verification.

It is highly recommended that you read pages **580–587**, **595–601**, **735–741**, and **966–983** very carefully and do **all** the exercises. The following are some of them that you are **REQUIRED** to practice on.

Quiz questions are mostly based on this list, with some minor modifications necessary. Consult your instructor and TAs if you have any problem with this list.

Part I

1. P558, Prob 22-2

2. P566, Ex 23.1-1.

3. P566, Ex 23.1-5.

4. Change the weights on the graph on page 568 by replacing each weight t with $(15 - t)$. Trace Kruskal's algorithm on the resulting graph.

5. Trace Prim's algorithm on the graph on page 571, starting with vertex d.

6. P573, Ex 23.2-2.
   Hint: see lecture slides.

7. P573, Ex 23.2-3.

8. P573, Ex 23.2-4.

9. P573, Ex 23.2-5.

10. P573, Ex 23.2-8.

11. P578, Prob 23-4.

Part II

1. P600, Ex 24.3-1.

2. P600, Ex 24.3-2.

3. P600, Ex 24.3-4.

4. P741, Ex 28.2-3.

5. P741, Ex 28.2-4.

6. P978, Ex 34.1-1.

7. Give a formal definition for the problem of finding the longest simple cycle in an undirected graph. Give a related decision problem.

8. P982, Ex 34.2-1.

9. P983, Ex 34.2-2.

10. P983, Ex 34.2-6.

11. P983, Ex 34.2-7.

12. P983, Ex 34.2-9.