COMP5311 Programming Assignment

- Due: Week 13 October 31 Friday 5 pm (hard copy at G86a and shhong@it.usyd.edu.au)
- You can choose one of the following problems: either Problem 1 or Problem 2.
- The submission begins with a signed statement stating that “the code for assessment was written entirely by myself” (with your signature).
- If you needed significant help with any part of the assignment, you should acknowledge all your sources and clearly refer them as a reference.

**Problem 1: Implementation of the Plane Sweep Algorithm**

- **Q1:** Implement the plane sweep algorithm which computes and reports all intersections (x,y coordinates) of n line segments in the 2D with O((n+k)logn) time, where k is the number of intersections.
- **Q2:** Based on the algorithm from the above question, write a program to compute intersections of rectilinear polygons (polygon with horizontal and vertical segment).
- Write a report about 10 pages with the following contents:
  1. Data structure
  2. Algorithm
  3. Implementation: language, platform
  4. Experimental Results: Run and test correctness of your program with the following three randomly generated line segments (polygon) data sets:
     - Small data set (10 < n < 100)
     - Medium size data set (100 < n < 1000)
     - Large data set (n > 1000)
     Present test results with running time.
  5. Discussion: report your experience and reflections
  6. References: acknowledge all the sources for your implementation
- Appendix: program code and the result

**Problem 2: Implementation of the Spring Algorithm**

- Implement one of the spring algorithms that construct a drawing of undirected graphs.
- Write a report about 10 pages with the following contents:
  1. Data structure
  2. Algorithm: the spring algorithm that you implement
  3. Implementation details: language, platform
  4. Experimental Results: Run and test effectiveness and efficiency of your program with the following six randomly generated data sets:
     - Small data set (10 < n < 30): both sparse (planar) and dense (general) graphs
     - Medium size data set (30 < n < 60): both sparse and dense graphs
     - Large data set (n > 100): both sparse and dense graphs
     Present each test results with pictures of the layout and running time.
     Present the details of the parameters that you set to get the best results (tuning).
  5. Discussion: report your experience and reflections
  6. References: acknowledge all the sources for your implementation
- Appendix: program code and the results.