WRIGHT STATE UNIVERSITY
Department of Computer Science and Engineering
CS7200-02: Algorithm Design and Analysis
Fall 2015 Assignment 1 (100 pts)
Due: October 12, 2015 by 12:00pm

(50 pts)

1. Implement Gale-Shapley Algorithm for computing Stable Marriage Assignment in ***Python, Java, C++ or MATLAB*** using the approach and data structures described in the first two Chapters of the Kleinberg and Tardos text. The input file should include number of subjects, n, preference list for men and women one line for each.

$$n$$
$$m_1: w_{11}, w_{12}, \ldots, w_{1n}$$
$$\ldots$$
$$m_n: w_{n1}, w_{n2}, \ldots, w_{nn}$$
$$\ldots$$
$$\ldots$$
$$w_1: m_{11}, m_{12}, \ldots, m_{1n}$$
$$\ldots$$
$$w_n: m_{n1}, m_{n2}, \ldots, m_{nn}$$

   a) Write the output, explicitly checking to see that it is a stable match. Turn in sample inputs and corresponding outputs in separate files.
   b) Run the algorithm on several instances of the problem for n = 10 with different input files and plot the variation in the running time.
   c) Run the algorithm on several instances of the problem for n = 10 with the same input file and plot the variation in the running time.
   d) Run the algorithm on problem instances with n = 1, 5, 10, 15, 20, 50, 100, and plot the average running time as a function of the problem input size (n^2).

(24 pts)

2. Do Problem 8 (a) (b) in Chapter 1 on Pages 27-28 of the Kleinberg and Tardos text.

(12 pts)

3. Do Problem 3 in Chapter 2 on Pages 67 of the Kleinberg and Tardos text. Provide a "clear" explanation in each case.

(14 pts)

4. Do Problem 4 in Chapter 2 on Pages 67-68 of the Kleinberg and Tardos text. Provide a "clear" explanation in each case.

TURNIN: Upload your source code, sample inputs/results, and timing plots as a single zip archive to the corresponding assignment DropBox on Pilot.