ECE 595 (Numerical Simulations) – Homework 1

Due January 18, 2013 at 4:30 pm

Note: please write your programs in C/C++ or MATLAB, and email them to Peter Bermel <pbermel@purdue.edu>. Please contact me first if you intend to use other languages.

1a. Given a network of cities connected by roads as shown in Fig. 1, write a code to find the shortest path from Chicago to all other cities.

1b. Is this problem **P**, **NP**, or uncomputable? How should the execution time of your program scale with the number of cities N (use big-oh notation)?
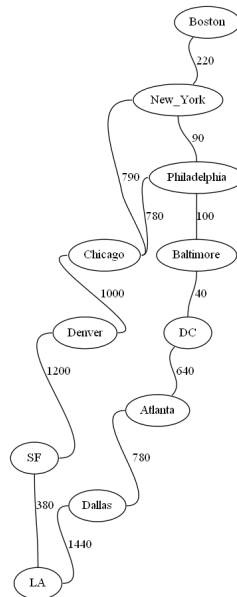

Figure 1: Graph of known road connections between cities in the continental US (not drawn to scale). Note that the distance (in miles) between each city pair is displayed in the middle of the line connecting them.

2a. Assume that you're a member of a band. You all want to build interest at nearby campuses on a limited budget with a tour. Given the network of cities shown in Fig. 2, write a code to visit each city exactly once before returning to West Lafayette as efficiently as possible (i.e., driving the least number of miles).

2b. Is this problem **P**, **NP**, or uncomputable? How should the execution time of your program scale with the number of cities N (use big-oh notation)?
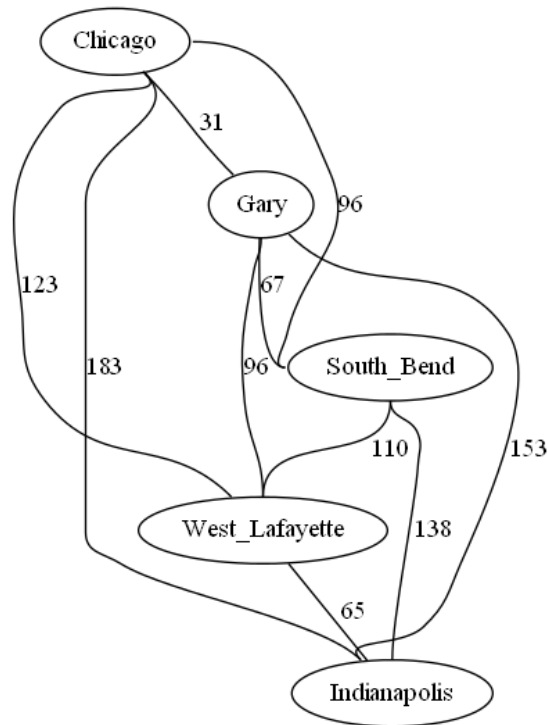

Figure 2: Fully connected graph of West Lafayette region (not drawn to scale). Note that the distance (in miles) between each city pair is displayed in the middle of the line connecting them.