CS 494/594, Graph Algorithms, Applications and Implementations
Spring 2015, Homework 3

1. Implement Dijkstra's algorithm. Your program should work on a simple, undirected, weighted graph, with positive integer edge weights. The source vertex should be 0. Your program should output a minimum weight path to each sink, and the cost of that path. In the case of ties, your program should select the lowest numbered vertex. Your program's output should look similar to the following.

```
>./dijkstra graph3.txt
Sink   Cost  Path
0      0     0
2      1     0-2
3      3     0-3
1      6     0-2-1
4      6     0-2-4
5      8     0-2-4-5
```

2. Implement a greedy coloring algorithm, selecting vertices to color in the sequence in which they are labeled, i.e. 0, 1, 2,…, n-1. Your program should output each vertex and its assigned color, as well as the total number of colors used, similar to the following. Note that the lowest numbered color is 0.

```
>./color graph4.txt
Vertex      Color
0              0
1              0
2              1
3              2
4              1
5              0
Colors Used  3
```

As usual, your programs should take a file name as a command-line argument and output to standard output. All graph files will be in the format discussed in class. All stipulations regarding the first two homework assignments remain in effect, except that here you may choose either an adjacency matrix or adjacency list to store the graph.

Submit your programs by emailing all necessary source code (including any needed makefile) and any other files necessary to compile and run your code to cphill25@utk.edu prior to the beginning of class next Wednesday, January 28. If you have any questions, please do not hesitate to email me or drop by during office hours.