CS575: Programming Assignment 4
Due at 11:59:59PM, April 25

1. [60%] Randomly create an undirected complete graph as follows:
   - Create n vertices where n is randomly selected between 5 and 10. Display the selected n value.
   - Create an n x n adjacency matrix A. Randomly assign a weight to each edge (i,j) where 1 ≤ i, j ≤ n. Specifically, make A[i,j] = 0 if i = j. If i ≠ j, assign an integer randomly selected between 1 and 10 to A[i,j]. Ensure that A[i,j] = A[j,i] since you need to create an undirected graph. Display the generated adjacency matrix.

   For the created undirected complete graph, do the following:
   1) [30%] Implement Prim's minimum spanning tree algorithm by programing priority queue either as array or heap data structure (Chapter 9). Print all the edges in the generated minimum spanning tree.
   2) [30%] Implement Kruskal's minimum spanning tree algorithm using the find3() and union3() functions in the lecture notes (Chapter 10). Print all the edges in the generated minimum spanning tree.

   - Note 1: Please let a user select one of the above two algorithms. Return an error message, if the selected algorithm is other than the above two algorithms.
   - Note 2: You are supposed to **implement the algorithms correctly for random undirected graphs** as described above. If your program produces correct results for some graphs but doesn't for other graphs, you will get zero.
   - Note 3: For grading purposes, don't pass any parameter to your main() function. You will lose 10% if you violate this requirement. If everybody follows this rule, grading may finish earlier.

2. [10%] 10% of the grade will be based on _good coding style_ and _meaningful_ comments.

All programming must be done using **C or C++ in Linux** where your code will be tested. Create a tar file that includes (1) source code files, (2) a Makefile to produce an executable, and (3) a readme file that clearly describes how to run your code. Submit only the tar file through the Blackboard. The name of the tar file should be yourlastname_yourfirstname _proj4.tar (Do not use special characters like #, @, or &, because they have caused Blackboard problems in the past.) Suppose that your assignment files are under the directory of /your_userid/yourlastname_yourfirstname_proj4/ and you are under that directory right now. To create a tar file under /your_userid directory, do the following in Linux command line:

>cd ..
>tar cvf yourlastname_yourfirstname_proj4.tar yourlastname_yourfirstname_proj4

To view the content of the created tar file, do the following in Linux command line:
>tar tvf yourlastname_yourfirstname_proj4.tar

Finally, read the following policies carefully:
- *All work must represent each individual student's own effort. If you show your code or any other part of your work to somebody else or copy or adapt somebody else's work found online or offline, you will get zero and be penalized per the Watson School Academic Honesty Code (http://www.binghamton.edu/watson/about/honesty-policy.pdf).*
- *To detect software plagiarism, everybody's code will be cross-checked using an automated tool.*
- *Your code will be compiled and executed. If your code does not compile or produce any runtime errors such as segmentation faults or bus errors, you will get zero.*
- *The instructor and TA will not read or debug your code. The instructor and TA will not take a look at an emailed code. If you need general directions, show your code to a TA during her office hours. The TA will not do programming or debugging for you though. The TA will only help you understand algorithms to be implemented and answer basic questions related to implementation.*