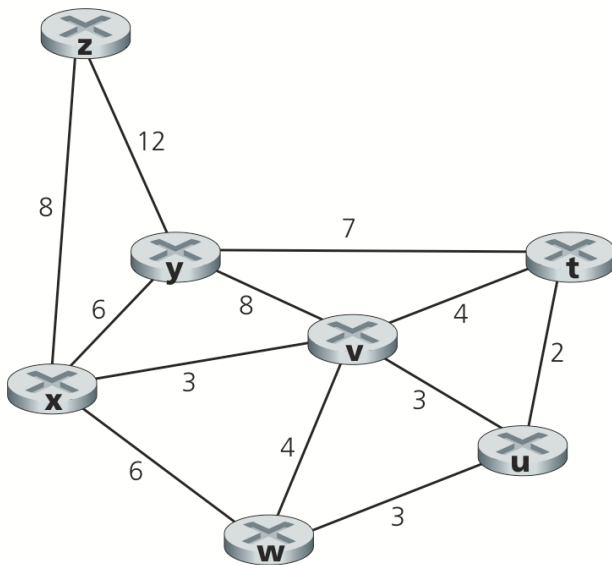# CS 575
Homework 6
Total: 100 points

Please scan and upload the written assignment along with the programming assignment.

Written Part (50 points)

1. Consider the following graph. Output the minimum spanning tree using Prim's algorithm. You should consider the implementation shown in lecture and update the color and key at each step. **(20 points)**

2. Show that the following problem is NP-complete. We are given sets $T_1, \ldots, T_m$ that cover some universe with n elements, and the goal is to find a family of sets with minimal cardinality (i.e., the minimum number of sets) whose union covers all the elements in the universe. For this reduction, use the vertex cover problem. You need to follow all the steps shown in class. **(30 points)**

Programming Part (50 points)

What to hand in?

1. Submit code with in-line documentation
2. Run your code on your local machine as well as on 'remote'. A readme file outlining how your code should be run.

You need to write the assignment in C, C++ or Java.

Problem 1: (25 points)

Consider a graph of V vertices and E edges. One standard way to input a graph is to use an adjacency matrix. The matrix is of size V*V. The value of the $(i,j)^{th}$ entry (i.e., i^{th} row and j^{th} column) denotes the edge weight between vertices i and j. If two vertices have no edges between them, then assign the edge weight to a large number. For this assignment, your program should be able to print out a table (exactly similar to the one taught in class) demonstrating the running of Dijkstra's algorithm. The program should be able to take as input (i.e., source) any vertex in the graph and then output the above table. Please use the graph provided in question 1 of the written part as reference.

Problem 2: (25 points)

In this problem, you will implement the Prim's algorithm taught in class. No other implementations will be accepted. Please use the graph provided in question 1 of the written part as reference.