Homework #1

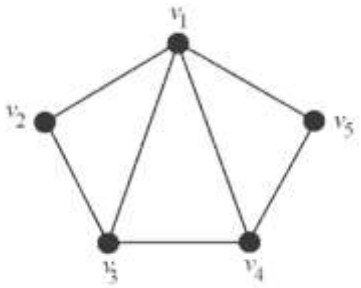
EECS 122: Introduction to Communication Networks, Spring 2016

Instructor: Shyam Parekh

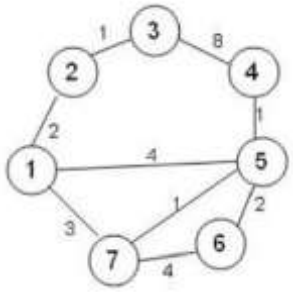
Assign Date: Jan 28, 2016, Due Date: Feb 9, 2016

100 Points

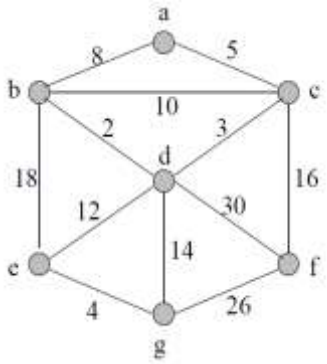
1. Incidence matrix: Find the incidence matrix of the following graph. **[10 Points]**



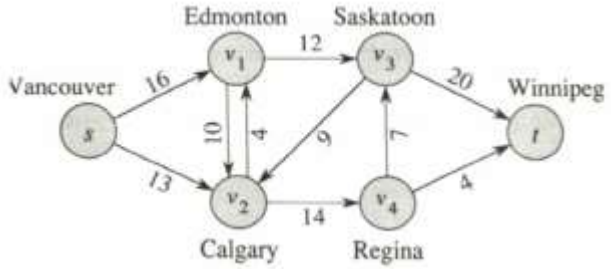
2. Run Dijkstra's algorithm on the following network to determine the routing table for node 3. **[25 Points]**



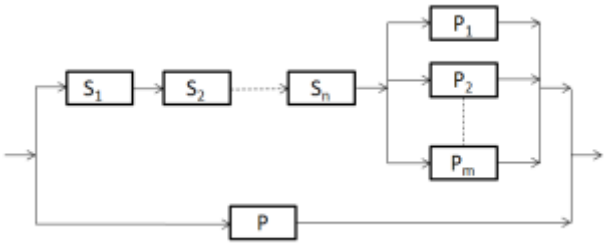
3. Spanning and Steiner Trees: **[7+7+16 Points]**
   3.1 Define Spanning Tree and Minimum Spanning Tree.
   3.2 What are the differences between a Spanning Tree and a Steiner Tree.
   3.3 Find a Minimum Spanning Tree for the graph below. What's the cost of this tree?



4. For the network shown below, find the value of maximum flow from Vancouver to Winnipeg. **[25 Points]**



5. Consider the reliability model shown below. All components have identical reliability characteristics. **[8+3+9 Points]**



5.1 For m=n=2, derive a general expression for the unreliability of the model.

5.2 Evaluate the unreliability of the system if all components have reliability of 0.8.

5.3 Repeat 5.2 when m and n both become large, when n becomes large and m = 1, and when m becomes large and n = 1.