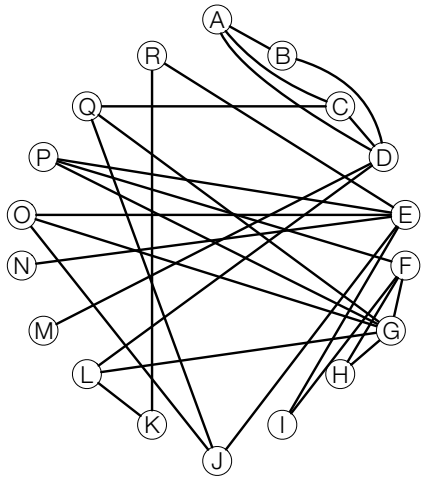
CSE 610 HW #2

(due Oct 21st)

Homeworks are to be done individually. Show your work and explain any assumption you make. Please use an editor, submissions with hand-writing will not be accepted. Email your work in pdf format before the class starts at 3.30. Have fun!

1. **(45 pts)** Consider the graph below.



   Find the breadth-first search trees that has;

   (a) the shortest height **(10 pts)**.

   (b) the longest height **(15 pts)**.

   (c) the least number of sibling edges **(20 pts)**.

2. **(15 pts)** Design an algorithm to find the BFS tree with the least number of sibling edges for a given undirected graph. Analyze the complexity of your algorithm.

3. **(40 pts)** Consider the hierarchical structure given below. Each square represents a subgraph where the root denotes the entire (connected) graph. A parent subgraph contains all the children subgraphs.

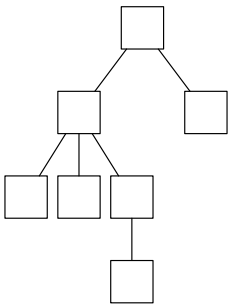


Figure 1: Hierarchy

(a) Assume that this is a hierarchy of k-cores. Draw (or describe) the smallest graph that has this structure **(15 pts)**.

(b) Assume that this is a hierarchy of k-trusses. Draw (or describe) the smallest graph that has this structure **(25 pts)**.