Due Oct 4, at Beginning of class

1. (10 points). Write your name clearly. Staple your HW. READ Chap 4 on MST, clustering, Huffman Coding

2. (30 points) Give an example of a weighted graph on 10 nodes that has exactly 2 minimal spanning trees. Give an example of a weighted graph on 10 nodes that has exactly 3 minimal spanning trees. For any $k$ show how to construct a graph (can be on any number of nodes) that has exactly $k$ minimal spanning trees.

3. (30 points) You are given a weighted graph with the edges already sorted. You are also given $k$. Give an algorithm to find the best clustering of the graph into $k$ parts. (You can assume that there is a data structure that does UNION in $O(1)$ steps and FIND in $O(\log^* n)$ steps.) Analyse the running time.

4. (30 points) Find an algorithm for the Clustering problem (input is $G = (V, E, w)$ and $k$) which is better than Kruskal’s algorithm (read the rest of the problem to understand this). Analyse the run time of your algorithm. The run time will be of the form

$$O(V + E \log V + f(k))$$

where you need to specify $f$. 