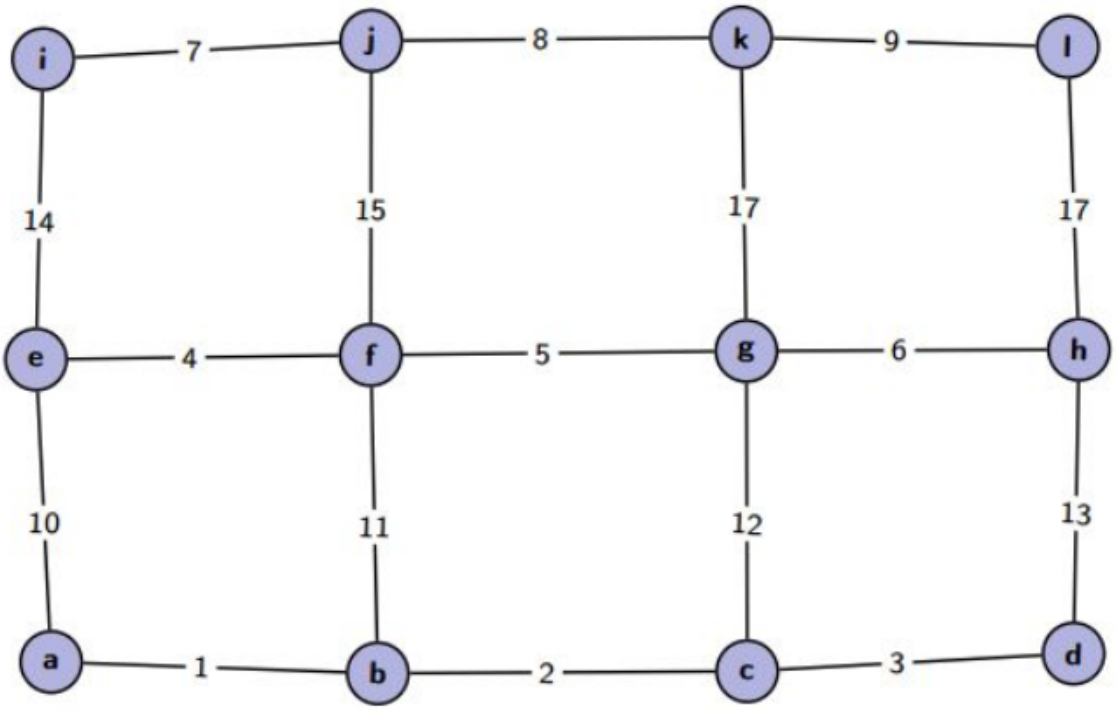
CSE 373 Section 8 Handout

Minimum Spanning Trees:

1. Consider the following graph:



a. Find an MST of this graph using Prim's algorithm. Show your work.

b. Find an MST of this graph using Kruskal's algorithm. Show your work.

c. Does this graph have multiple MSTs? Why or why not?

d. What are the asymptotic runtimes of Prim's and Kruskal's algorithms?

Sorting

2. The following arrays are partially sorted, the result of a malicious TA interrupting the sorting algorithm being performed on each array. Use your knowledge of comparison based sorting to determine which algorithm was being used on each array.

Choose from the following types of sorts (each appears exactly once):
Insertion Sort, Merge Sort, Selection Sort
[Make sure you have an explanation of why it is the case]

-5	2	19	53	44	91	87	35

Algorithm used:

29	35	44	114	37	30	28	46

Algorithm used:

6	10	3	50	15	60	1	34

Algorithm used:
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3. Answer the following:

a) We are expecting the majority of the data that we are sorting to be "almost" in order. What would be a good sorting algorithm to use?

b) Our mobile application needs to sort an array of comparable elements. Being a mobile application, we would like to use as little extraneous memory as possible. Which sorting algorithm should we use?

c) If our data was guaranteed to always be in reverse order, what is the worst sorting algorithm we could possibly use (assuming we NEED it in order)?

d) Which sorting algorithm would be best to sort integers in the domain of [-50, 50]?

4. Write pseudocode for a topological sort iterator, such that when calling next() consecutively you will get a valid topological sort.

   [Note: Remember that an iterator contains two important functions: hasNext() and next()]