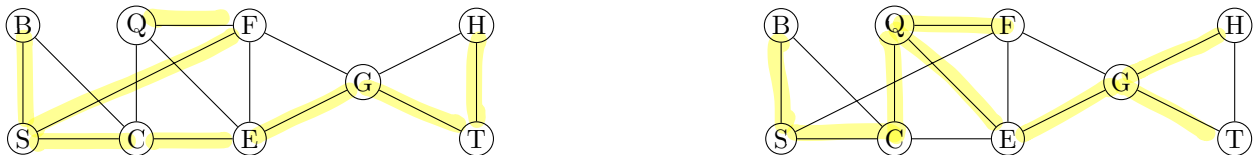


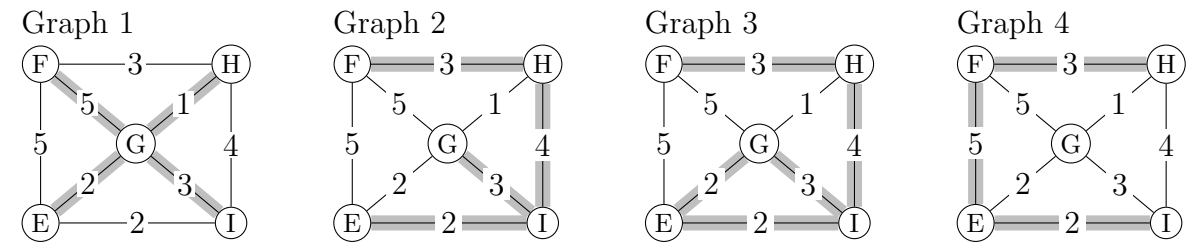
Worksheet 11 (Graph Theory 3): Minimum Cost Spanning Tree

Group Names: _____

1. Find two different spanning trees in the graph below. Draw one on each copy of the graph.



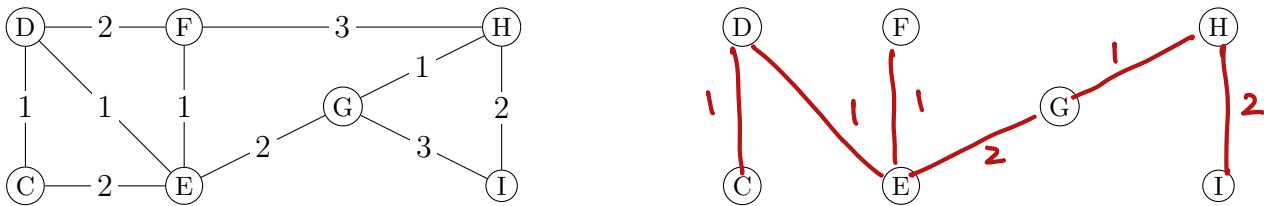
2. Here are four different subgraphs in a weighted graph. Graphs 1 and 2 are spanning trees.



- (a) What is the total cost of the spanning tree in Graph 1? 11
- (b) What is the total cost of the spanning tree in Graph 2? 12
- (c) Which spanning tree has smaller total cost? graph 1
- (d) Why is the subgraph in Graph 3 not a spanning tree? has a circuit
- (e) Why is the subgraph in Graph 4 not a spanning tree? misses E

3. Use Kruskal’s Algorithm to find a minimum cost spanning tree in the following graph. Break any ties by choosing the edge that comes earlier in the alphabet. (For example, edge DC is the same edge as edge CD , and CD alphabetizes earlier than GH .)

Construct a minimum cost spanning tree in the second graph, and keep track of the steps of the algorithm, the edges that you are using and the weights, in the table below.



	Used?	edges	weights
1	✓	CD	1
5	x	CE	2
2	✓	DE	1
6	x	DF	2
3	✓	EF	1
7	✓	EG	2
		FH	3
4	✓	GH	1
8		GI	3

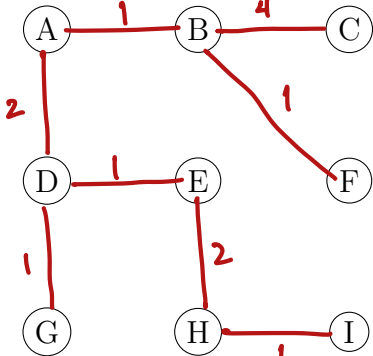
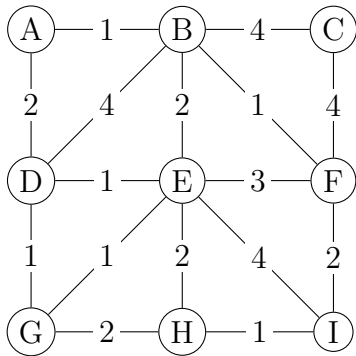
Stop after 8 steps

What is the total cost of the spanning tree you found? 8

4. Use Kruskal’s Algorithm to determine a minimum cost spanning tree in the following graph. Break any ties by choosing the edge that comes earlier in the alphabet. (For example, edge *DC* is the same edge as edge *CD*, and *CD* alphabetizes earlier than *GH*.)

Construct a minimum cost spanning tree in the second graph, and keep track of the steps of the algorithm, the edges that you are using and the weights, in the table below.

For convenience, I have listed the edges of the graph in sorted order for you.



Sorted edges	weight
<i>AB</i>	1
<i>BF</i>	1
<i>DE</i>	1
<i>DG</i>	1
<i>EG</i>	1
<i>HI</i>	1
<i>AD</i>	2
<i>BE</i>	2
<i>EH</i>	2
<i>FI</i>	2
<i>GH</i>	2
<i>BC</i>	4
<i>BD</i>	4
<i>CF</i>	4
<i>EI</i>	4
<i>GH</i>	5
<i>HI</i>	6

Used?	edges	weights
✓	<i>AB</i>	1
✓	<i>BF</i>	1
✓	<i>DE</i>	1
✓	<i>DG</i>	1
X	<i>EG</i>	
✓	<i>HI</i>	1
✓	<i>AD</i>	2
X	<i>BE</i>	
✓	<i>EH</i>	2
X	<i>FI</i>	
X	<i>GH</i>	
✓	<i>BC</i>	4
	stop	

What is the total cost of the spanning tree you found? 13