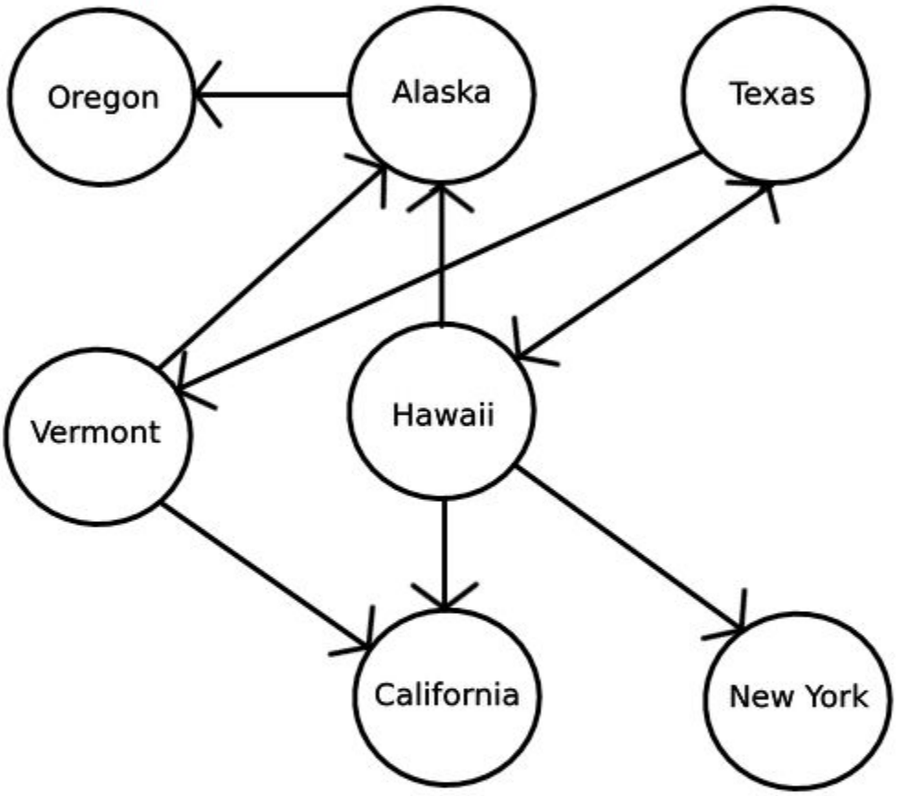
CMSC204
Kartchner

V(StateGraph) = {Oregon, Alaska, Texas, Hawaii, Vermont, NewYork, California}
E(StateGraph) = {(Alaska, Oregon), (Hawaii, Alaska), (Hawaii, Texas), (Texas, Hawaii), (Hawaii, California), (Hawaii, New York), (Texas, Vermont), (Vermont, California), (Vermont, Alaska)}

1. Draw the StateGraph



1. Describe the graph pictured above, using the formal graph notation.

   V(StateGraph) = {Alaska, California, Hawaii, NewYork, Oregon, Texas, Vermont}

   E(StateGraph) = {ao, ha, ht, th, hc, hn, tv, vc, va}

2. a. Is there a path from Oregon to any other state in the graph? No

   b. Is there a path from Hawaii to every other state in the graph? No

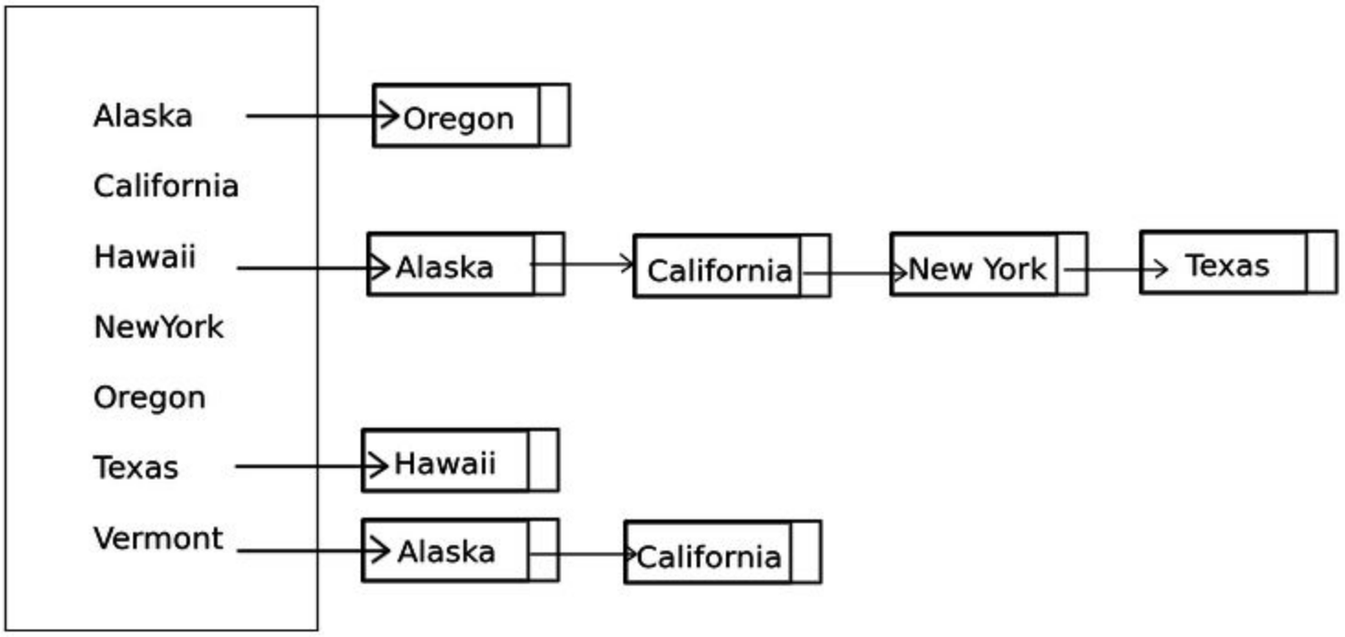
   c. From which state(s) in the graph is there a path to Hawaii? Texas

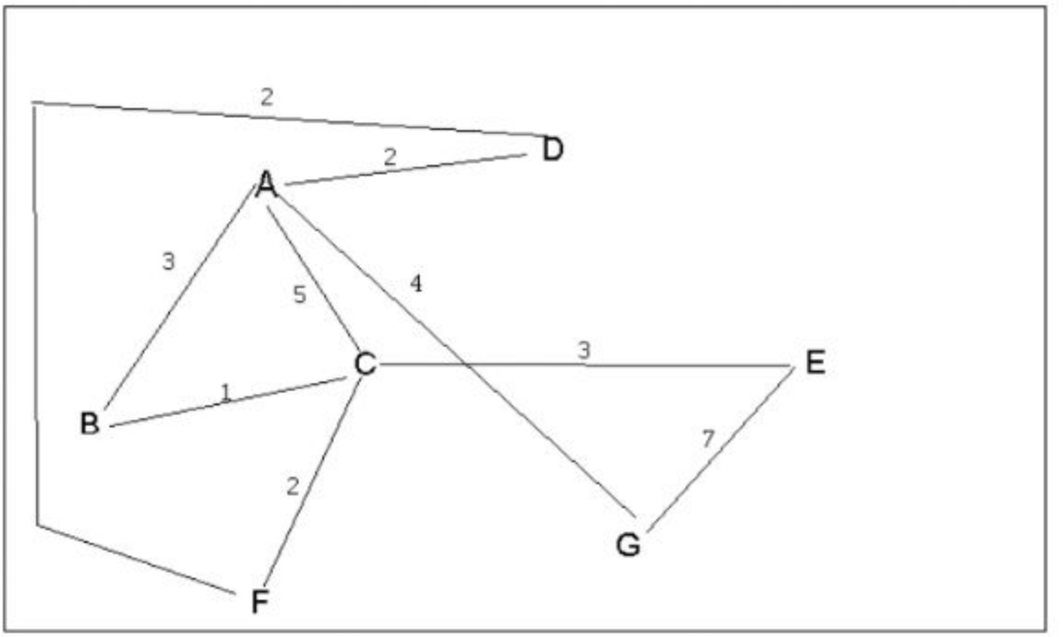
3. a. Show the adjacency matrix that would describe the edges in the graph.
Store the vertices in alphabetical order

States
Alaska
California
Hawaii
NewYork
Oregon
Texas
Vermont

AK	CA	HI	NY	OR	TX	VT
0	0	0	0	1	0	0
0	0	0	0	0	0	0
1	1	0	1	0	1	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	1	0	0	0	1
1	1	0	0	0	0	0

3. b. Show the adjacency lists
that would describe the edges in the graph



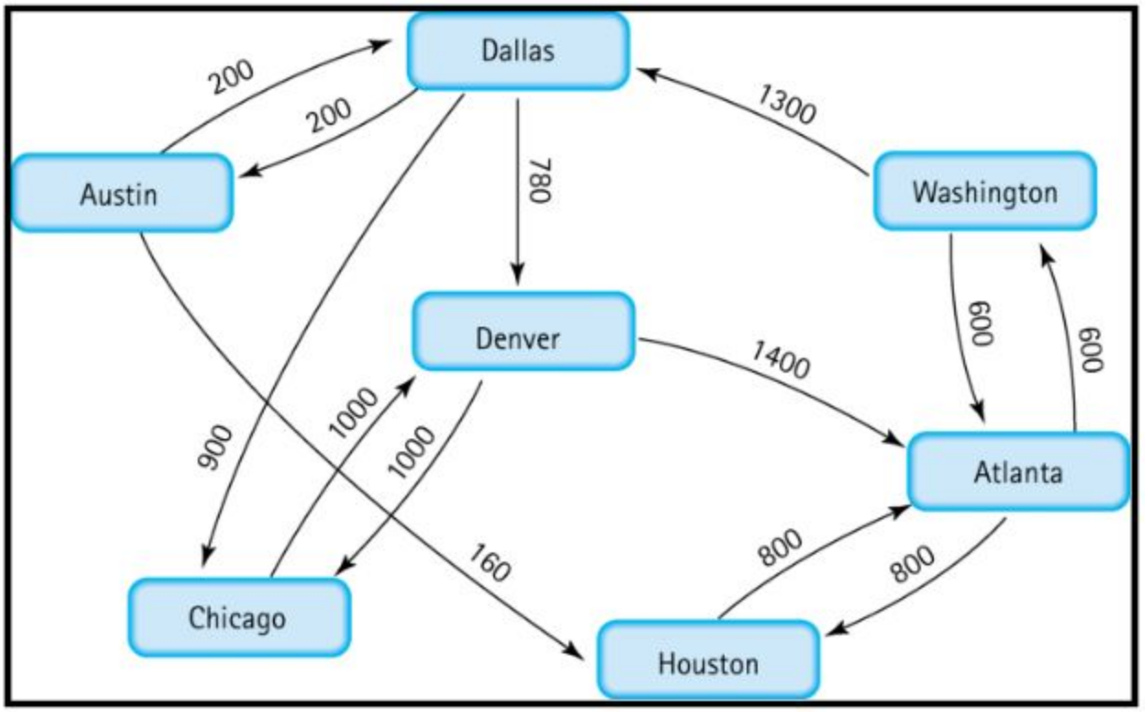


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

A) E, G, F, C, D, B, A
B) G, A, E, C, B, F, D
C) E, G, A, D, F, C, B
D) E, C, F, B, A, D, G

4 b. Which of the following lists the graph nodes in breadth first order beginning at F?

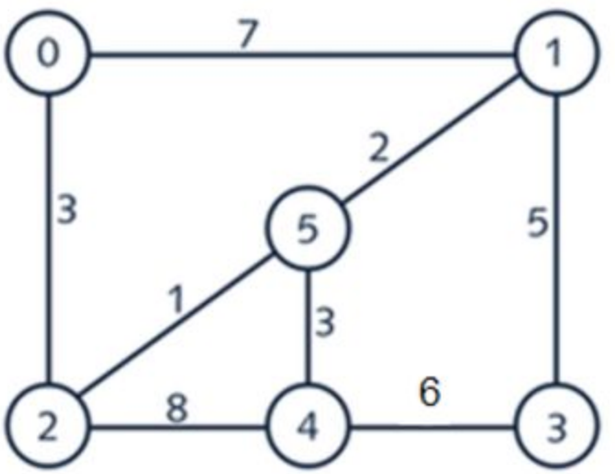
A) F, C, D, A, B, E, G
B) F, D, C, A, B, C, G
C) F, C, D, B, G, A, E
D) a, b, and c are all breadth first traversals



5. Find the shortest distance from Atlanta to every other city

Austin: Atlanta -> Washington -> Dallas -> Austin = (600 + 1300 + 200) = 2100
Chicago: Atlanta -> Washington -> Dallas -> Chicago = (600 + 1300 + 900) = 2800
Dallas: Atlanta -> Washington -> Dallas = (600 + 1300) = 1900
Denver: Atlanta -> Washington -> Dallas -> Denver = (600 + 1300 + 780) = 2680
Houston: Atlanta -> Houston = 800
Washington: 600

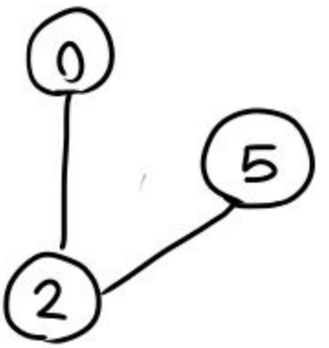
6. Find the minimal spanning tree using Prim's algorithm. Use 0 as the source vertex . Show the steps.



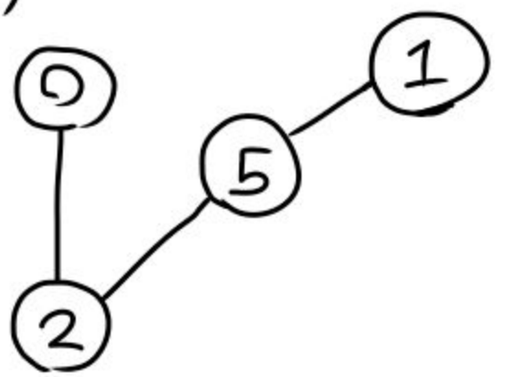
1)

2)

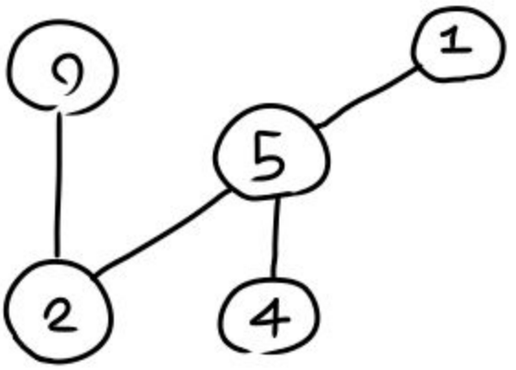
3)



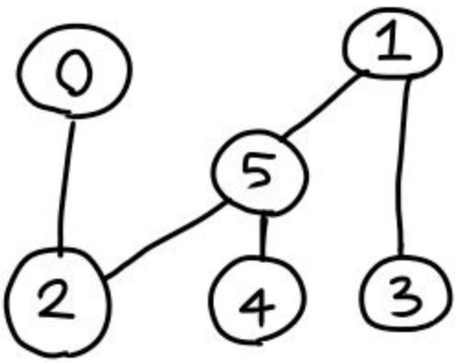
4)



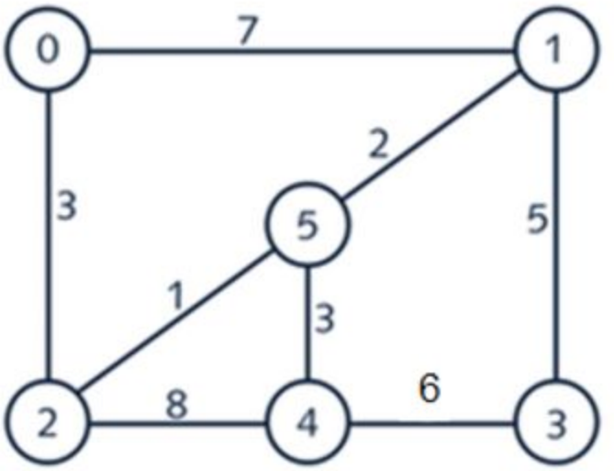
5)



6)

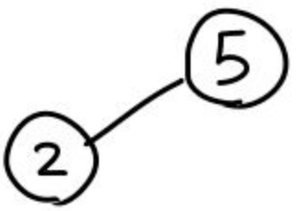


7. Find the minimal spanning tree using Kruskal's algorithm. Show the weights in order and the steps.

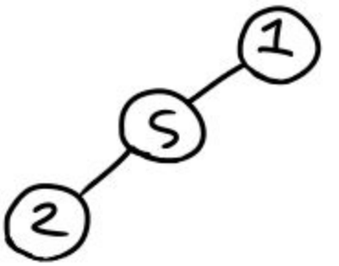


edges	Weights
2-5	1
1-5	2
4-5	3
0-2	3
1-3	5
3-4	6
0-1	7
2-4	8

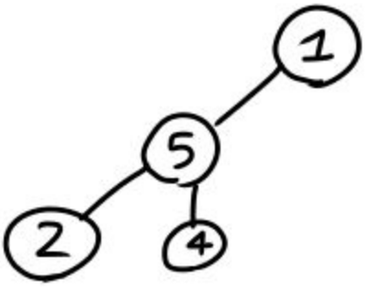
1)



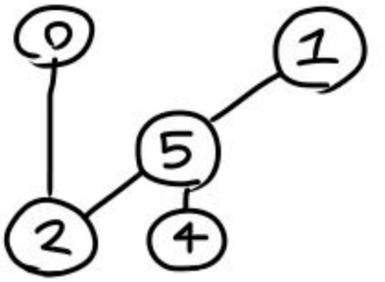
2)



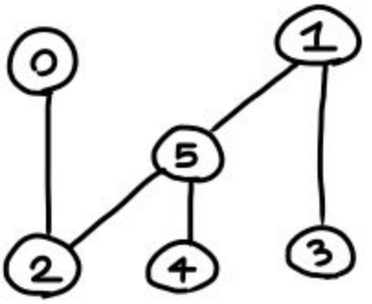
3)



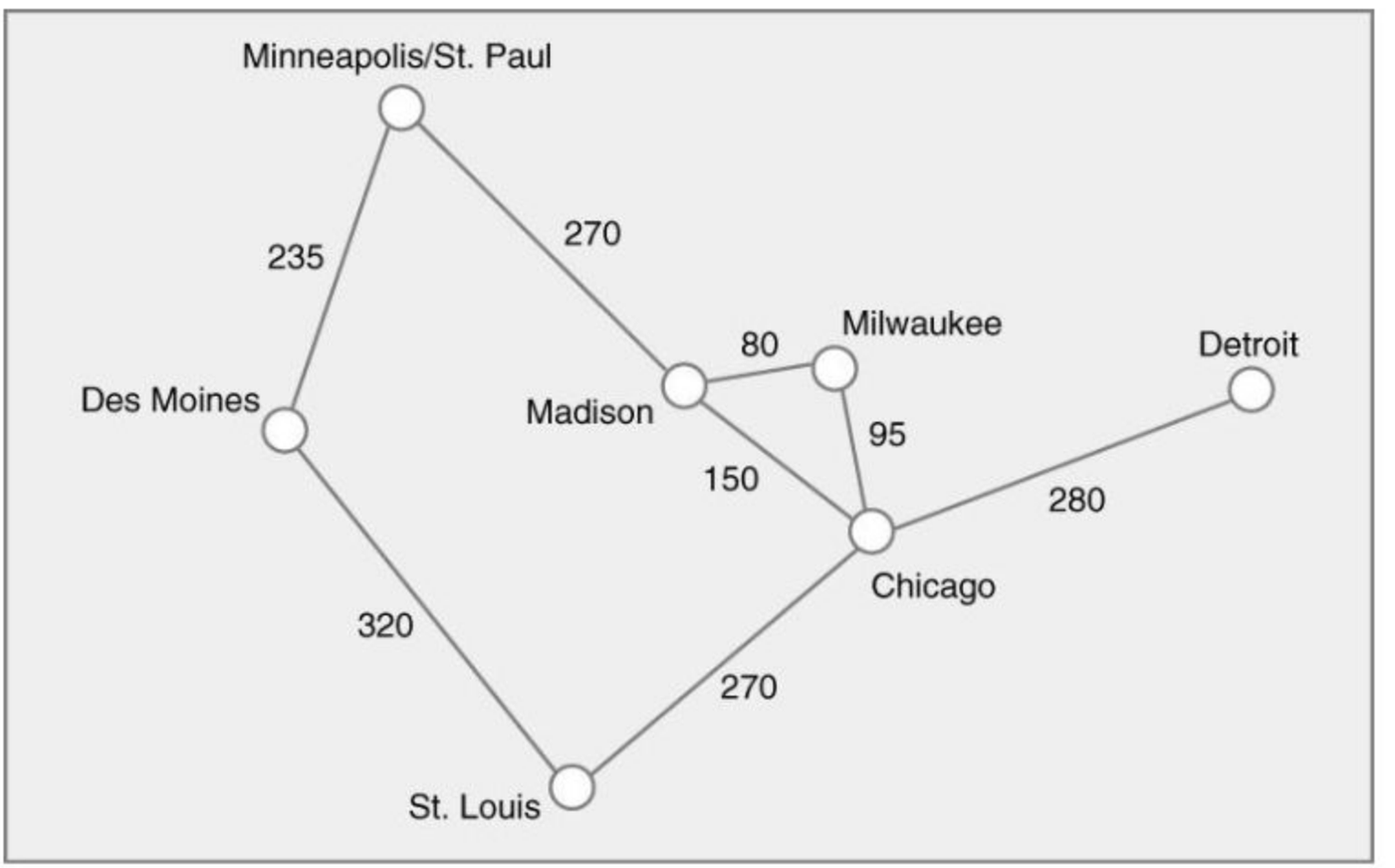
4)



5)



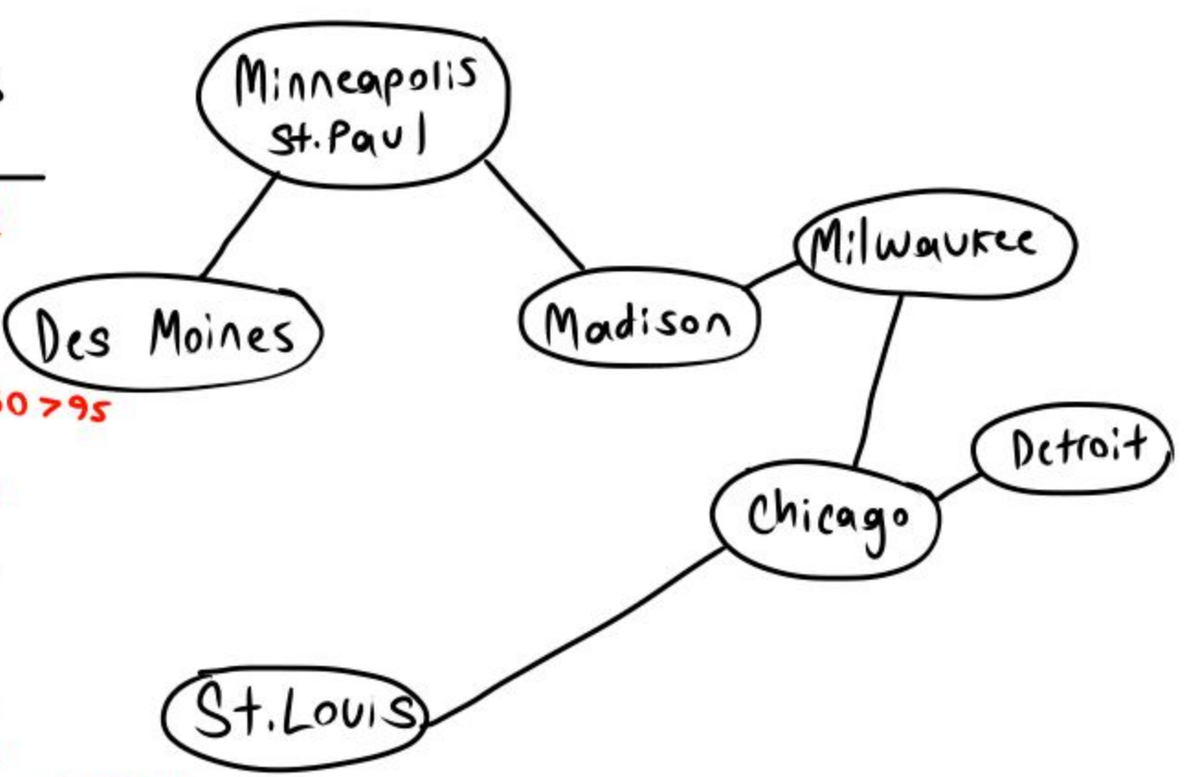
8. Find the minimal spanning tree using the algorithm you prefer. Use Minneapolis/St. Paul as the source vertex



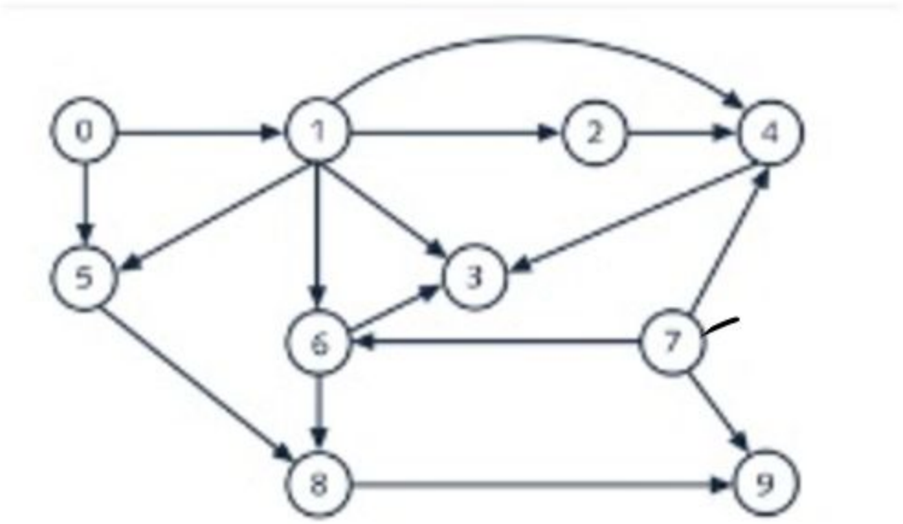
Kruskal's

edges	Weights	
Ma-Mi	80	1
Mi-Ch	95	2
Ma-Ch	150	150 > 95
Sp-Dm	235	3
Sp-Ma	270	4
Ch-Sl	270	5
Ch-De	280	6
Dm-Sl	320	

Stop because edges = 6 and V1 - 1 = 6



9. List the nodes of the graph in a breadth first topological ordering. Show the steps using arrays predCount, topologicalOrder and a queue



predCount

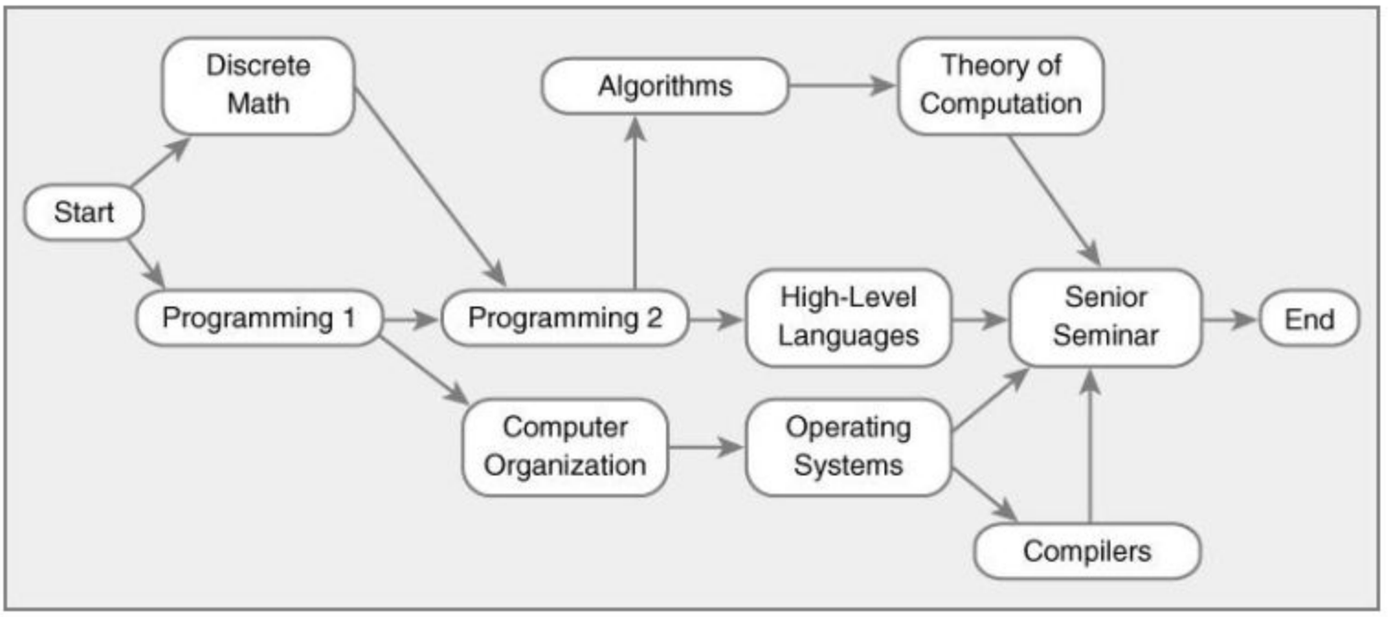
1	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	0	0
1	1	0	0	1	1	1	1	0	1
1	1	1	3	2	1	1	1	2	1

Topological order

0	0	0	0	0	0	0	0	0	0
0	7	0	0	0	0	0	0	0	0
0	7	1	5	4	6	9	0	0	0
0	7	1	5	4	6	9	2	3	8

Queue - 0715469238

10. List the nodes of the graph in a breadth first topological ordering.



Discrete Math, Programming 1, Programming 2, Computer Organization, Algorithms, High-Level Languages, Operating Systems, Theory of Computation, Senior Seminar, Compilers