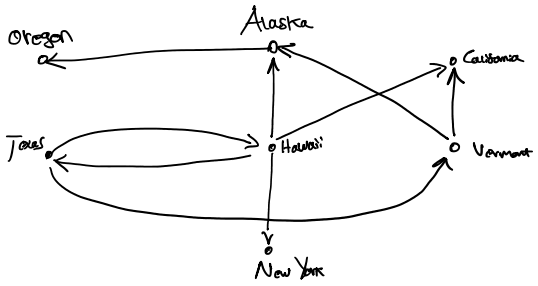
Graph Lab

Wednesday, November 11, 2020 10:14 AM

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, Oregon), (Hawaii, Alaska), (Hawaii, Texas), (Texas, Hawaii), (Hawaii, California), (Hawaii, New York), (Texas, Vermont), (Vermont, California), (Vermont, Alaska)}**

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

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

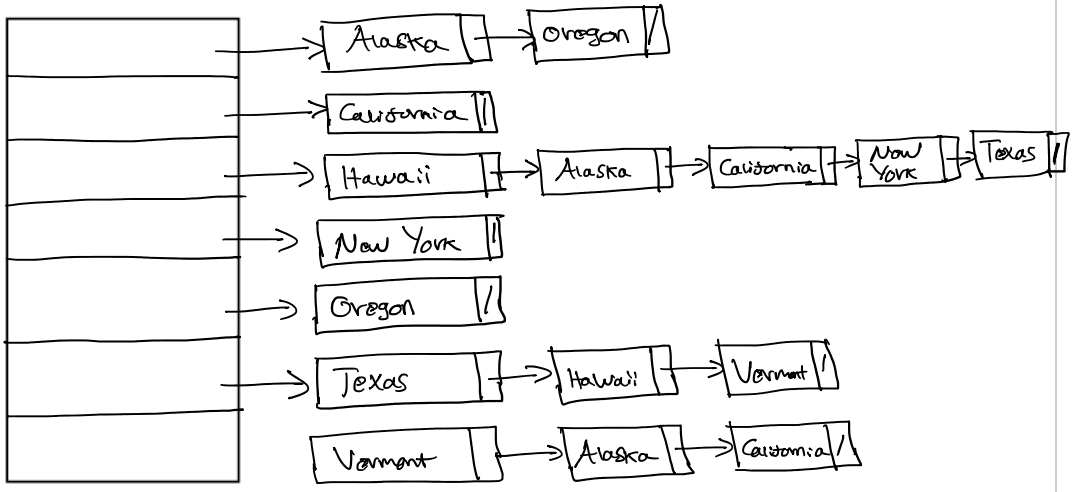
   b. Is there a path from Hawaii to every other state in the graph? Yes

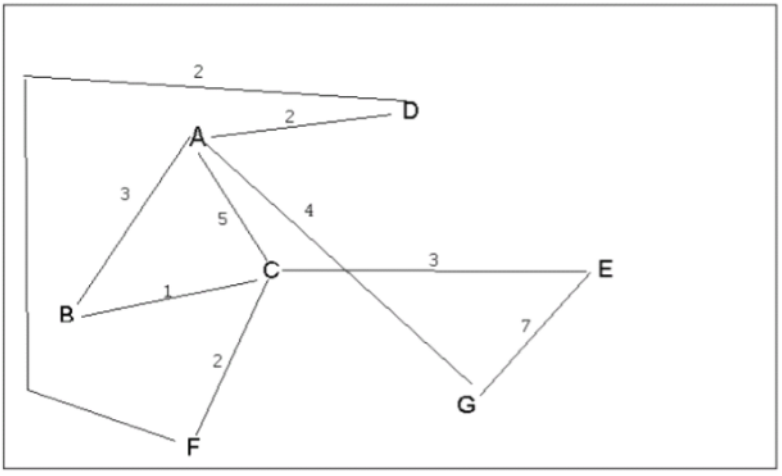
   c. From which state(s) in the graph is there a path to Hawaii? Texas

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

	Alaska	California	Hawaii	New York	Oregon	Texas	Vermont
Alaska	0	0	0	0	1	0	0
California	0	0	0	0	0	0	0
Hawaii	1	1	0	1	0	1	0
New York	0	0	0	0	0	0	0
Oregon	0	0	0	0	0	0	0
Texas	0	0	1	0	0	0	1
Vermont	1	1	0	0	0	0	0

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



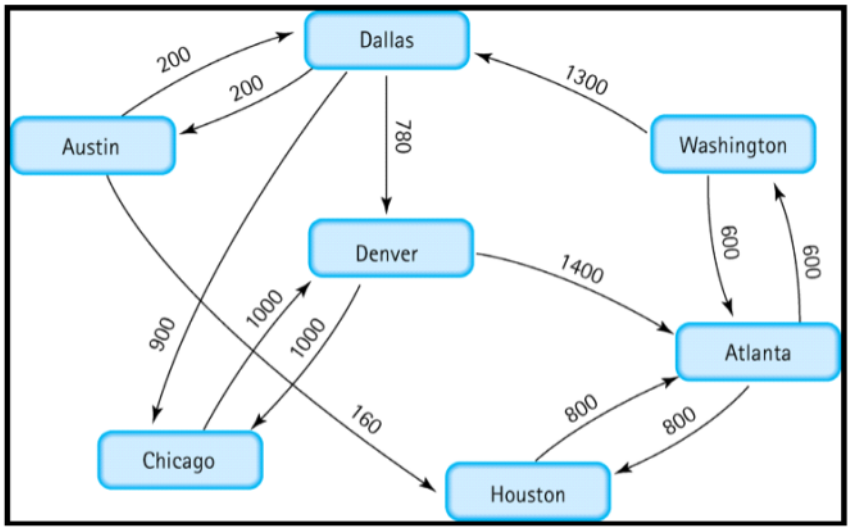


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

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?

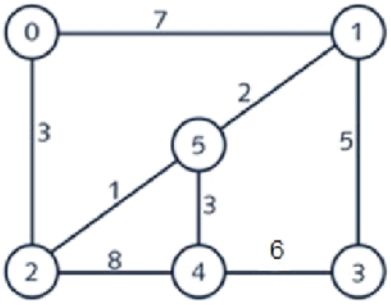
A) F, C, D, A, B, E, G
B) F, D, C, A, B, C, G
C) F, C, D, B, G, A, E
D) a, b, and c are all breadth first traversals



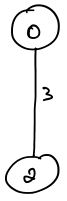
5. Find the shortest distance from Atlanta to every other city

To Washington 600
To Houston 800
To Dallas 1300
To Denver 2680
To Austin 2100
To Chicago 2800

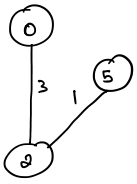
6. Find the minimal spanning tree using Prim's algorithm. Use 0 as the source vertex . Show the steps.



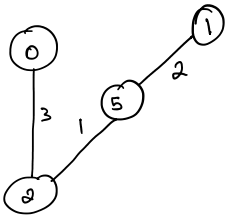
1)



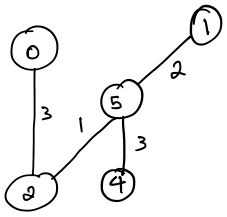
2)



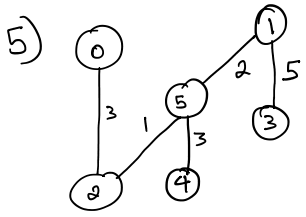
3)



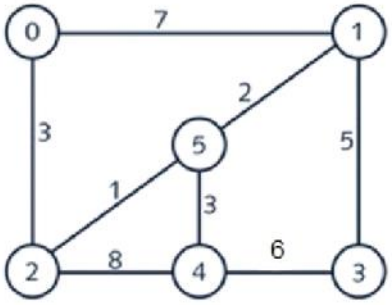
4)



5)

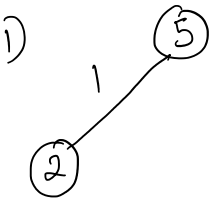


7. Find the minimal spanning tree using Kruskal's algorithm. Show the weights in order and the steps.



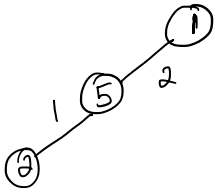
Weight List = {1,2,3,3,4,5,6,7,8}

1)



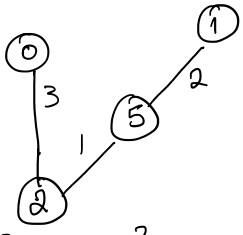
W.L = {2,3,3,5,6,7,8}

2)



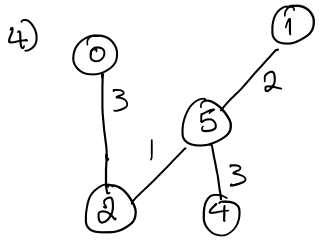
W.L = {3,3,5,6,7,8}

3)



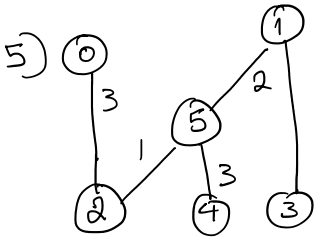
W.L = {3,5,6,7,8}

4)



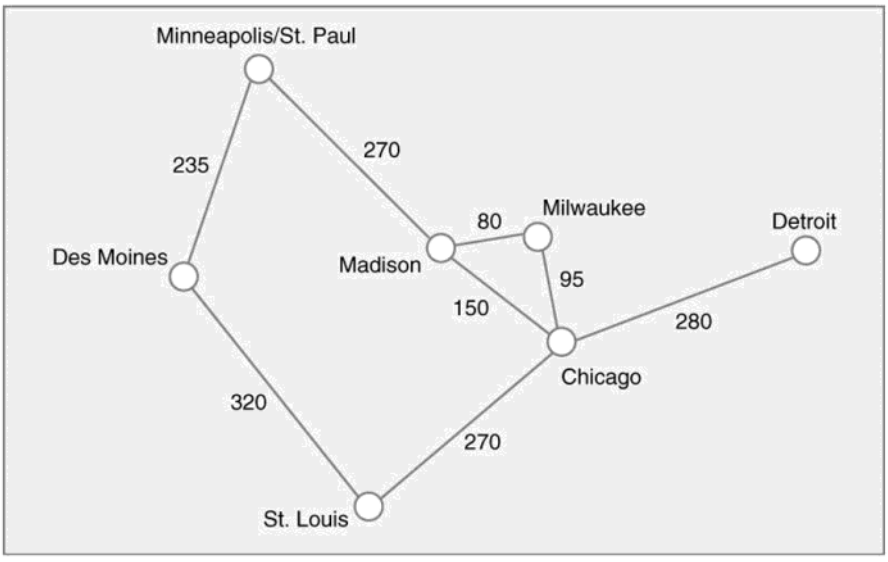
W.L = {5,6,7,8}

5)



W.L = {6,7,8}

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

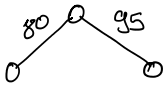


Weight List = { 80, 95, 150, 235, 270, 270, 280, 320 }

1)

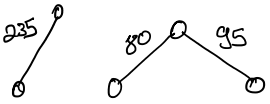
{ 95, 150, 235, 270, 270, 280, 320 }

2)



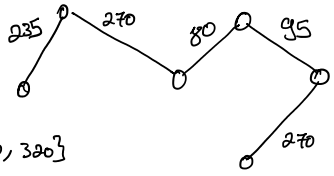
{ 150, 235, 270, 270, 280, 320 }

3)



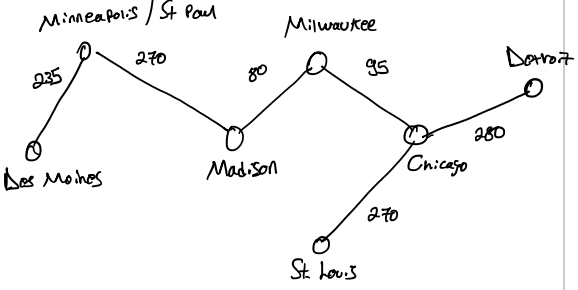
{ 270, 270, 280, 320 }

4)

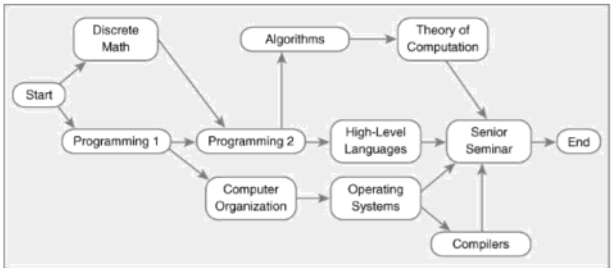


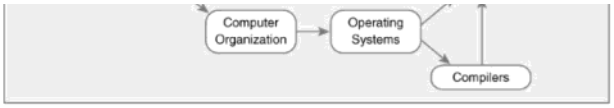
{ 280, 320 }

5)



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





1)

0	1	1	3	3	2	2	0	2	2

Pred Count

0	7			

queue

0									

topologicalOrder

2)

0	0	1	3	3	1	2	0	2	2

Pred Count

7	1			

queue

0	7								

topologicalOrder

3)

0	0	1	3	2	1	1	0	2	1

Pred Count

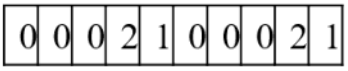
1				

queue

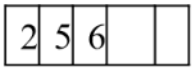
0	7	1							

topologicalOrder

4)

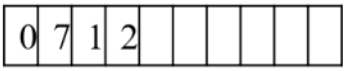


PreCount

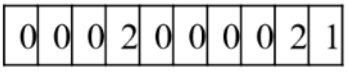


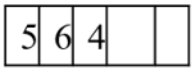
Queue

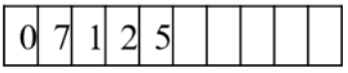
topologicalOrder



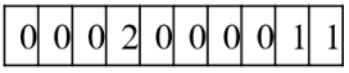
5)



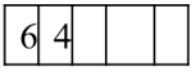




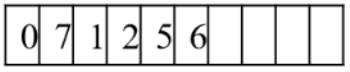
6)



PreCount

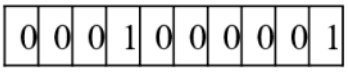


Queue

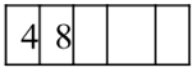


topologicalOrder

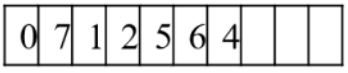
7)



PreCount

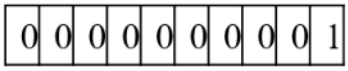


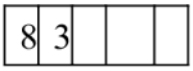
Queue

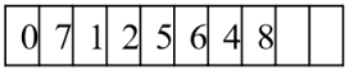


topologicalOrder

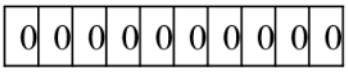
8)







9)

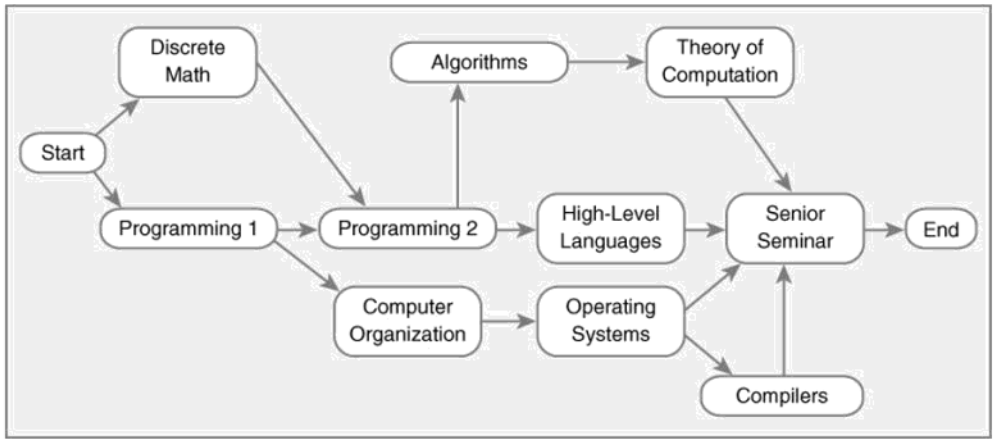


PreCount

Queue

topologicalOrder

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



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