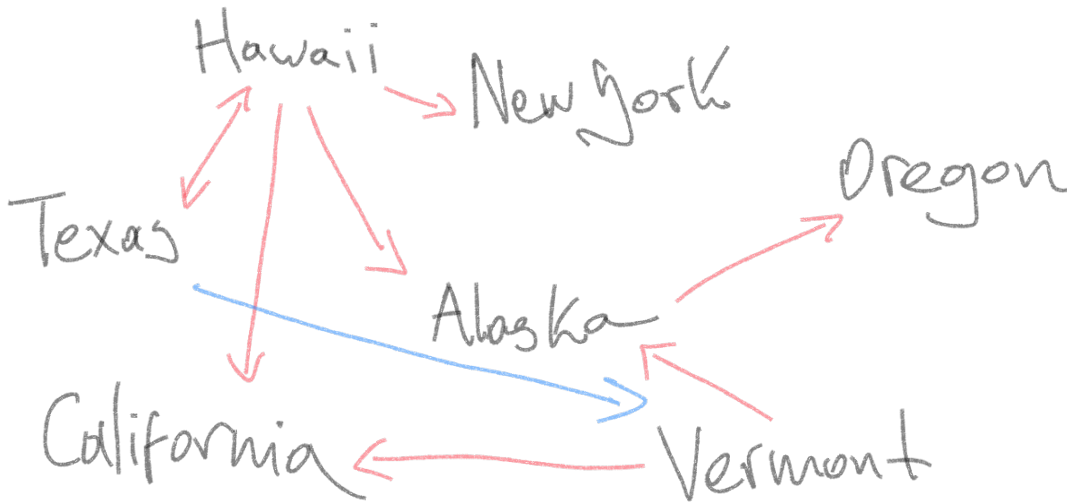


CMSC204  
Kartchner

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

1. Draw the StateGraph



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

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

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?

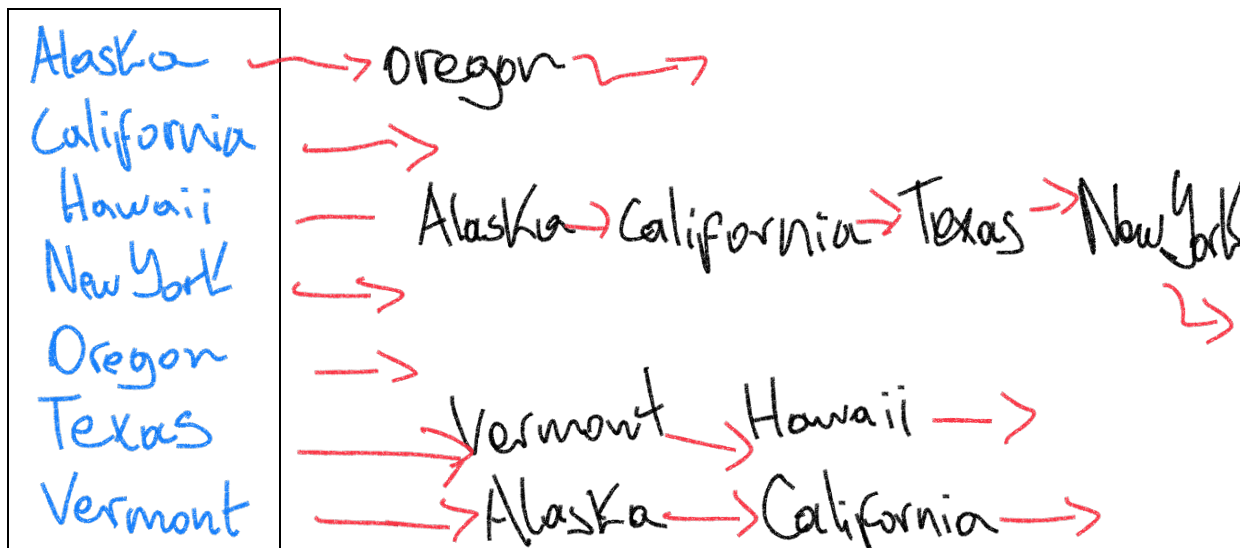
Texas

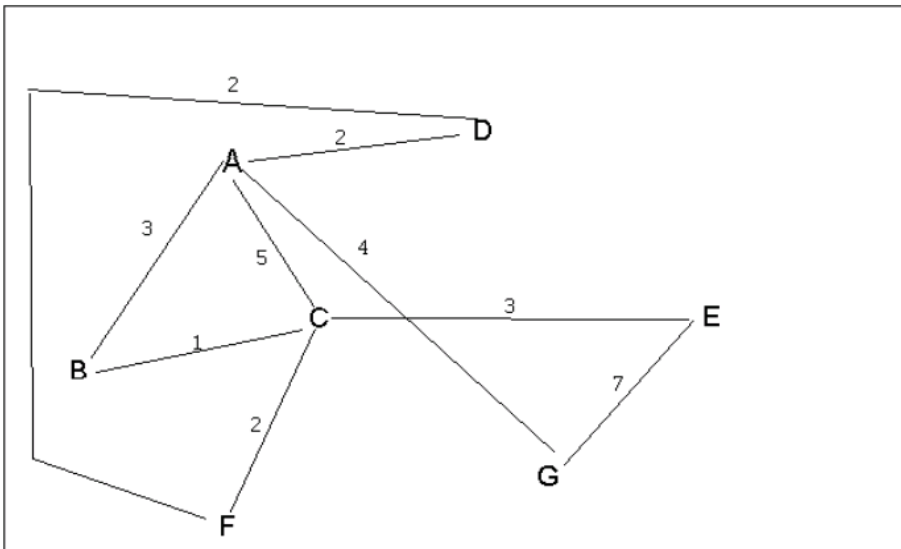
3. a. Show the adjacency matrix that would describe the edges in the graph.  
Store the vertices in alphabetical order

States

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

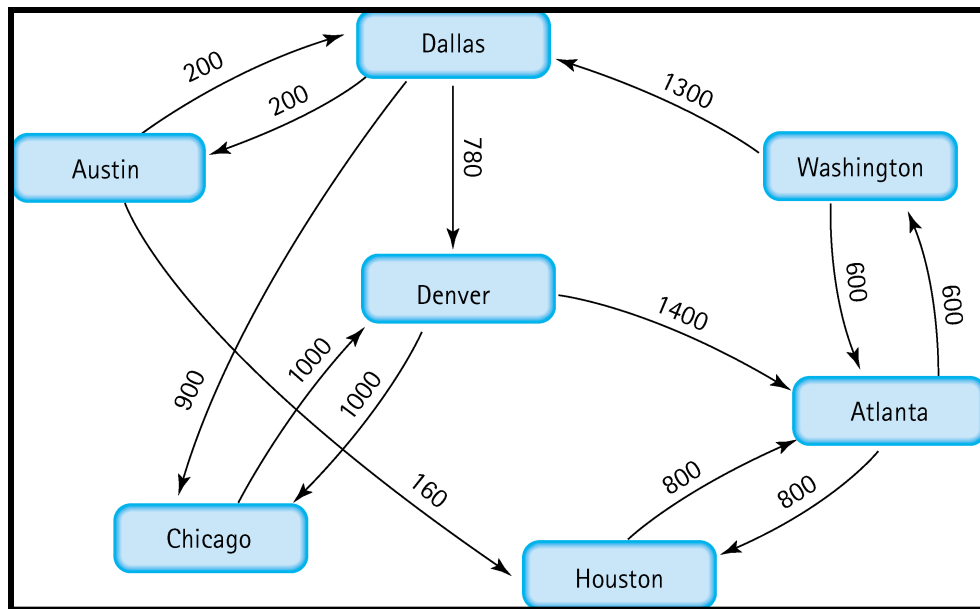
4 b. Which of the following lists the graph nodes in breadth first order beginning at F?

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

Atlanta to Washington 600

Atlanta to Denver  $600 + 1300 + 780 = 2680$

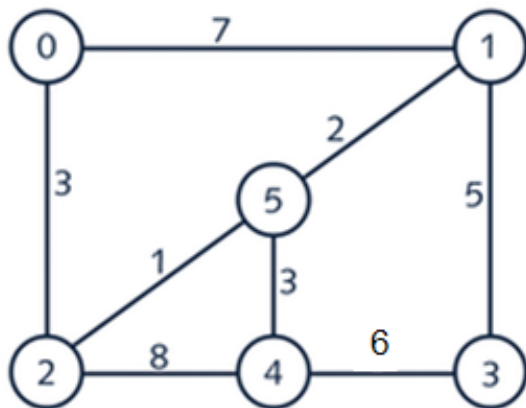
Atlanta to Chicago  $600 + 1300 + 900 = 2800$

Atlanta to Austin  $600 + 1300 + 200 = 2100$

Atlanta to Houston 800

Atlanta to Dallas  $600 + 1300 = 1900$

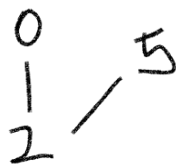
6. Find the minimal spanning tree using Prim's algorithm. Use 0 as the source vertex . Show the steps.



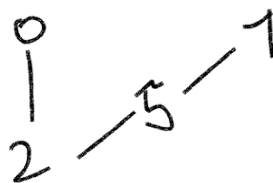
Step 1



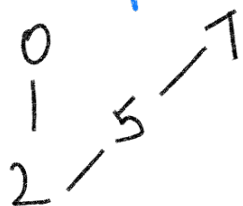
Step 2



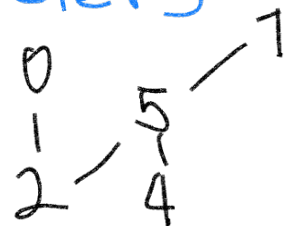
Step 3



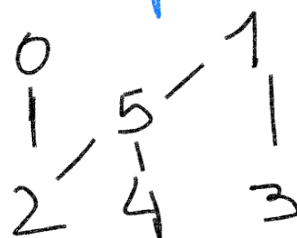
Step 4



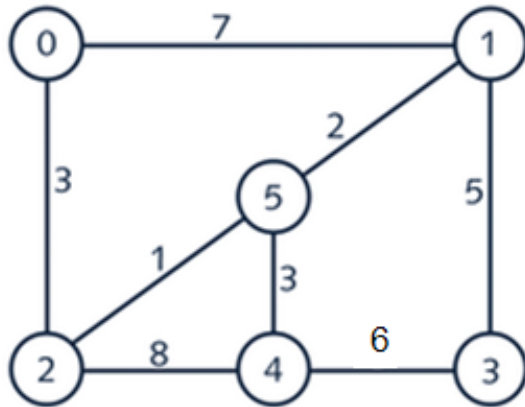
Step 5



Step 6



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



Step 1

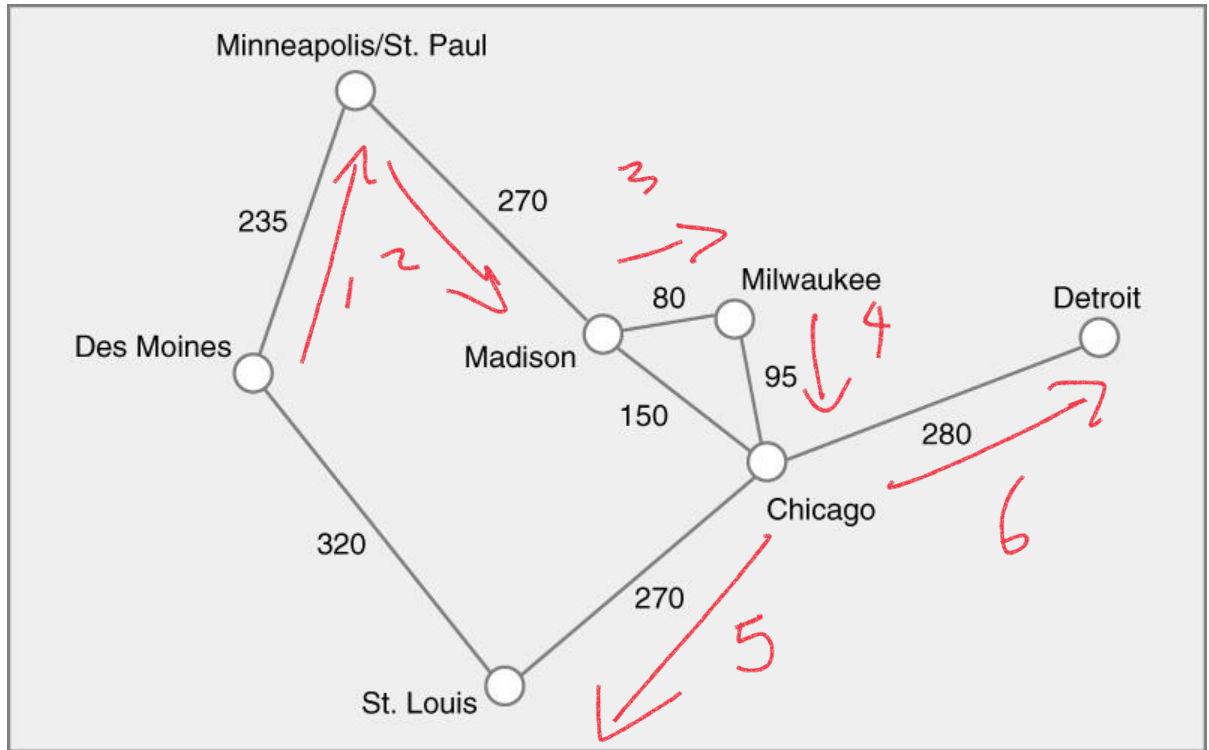
Step 2

Step 3

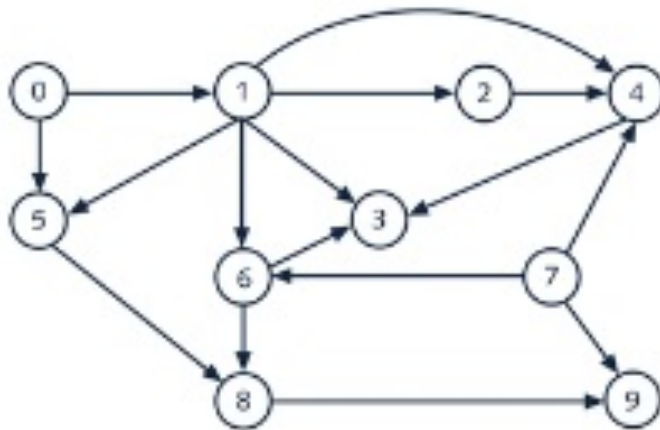
Step 4

Step 5

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



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



PredCount [0][1][2][3][4][5][6][7][8][9]  
0 1 1 3 3 2 2 0 2 2

Topological  
Order

queue 0, 7

---

PredCount [0][1][2][3][4][5][6][7][8][9]  
0 0 1 3 3 1 2 0 2 2

Topological  
Order

queue 7, 1



PredCount [0][1][2][3][4][5][6][7][8][9]  
0 0 1 3 2 1 2 0 2 1

Topological  
Order 0 7

queue 1

PredCount [0][1][2][3][4][5][6][7][8][9]  
0 0 0 2 1 0 0 0 2 1

Topological  
Order 0 7 1

queue 2, 5, 6

PredCount [0][1][2][3][4][5][6][7][8][9]  
0 0 0 1 0 0 0 0 0 1

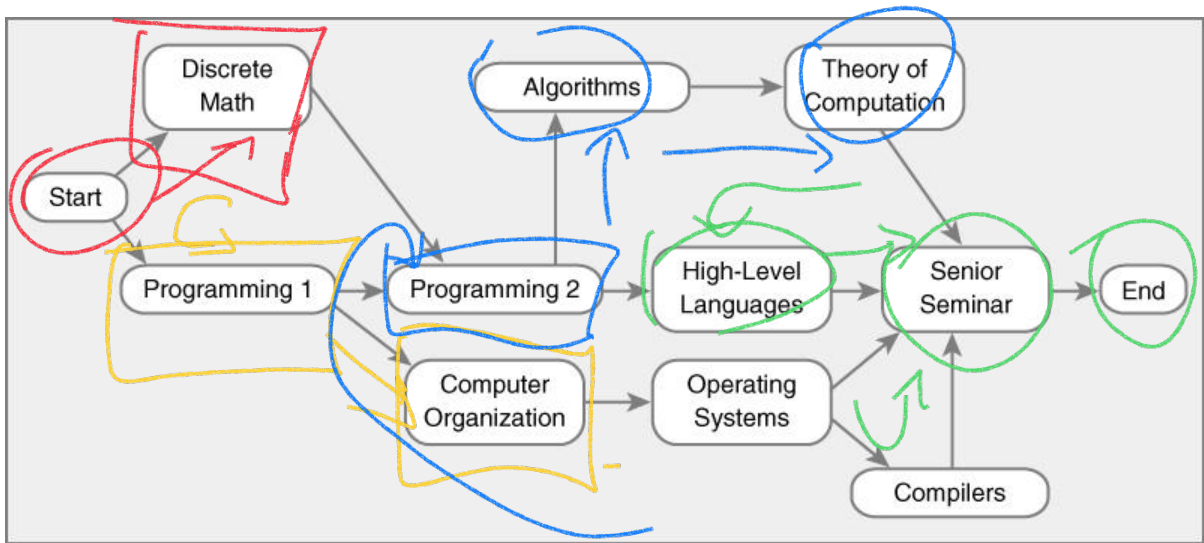
Topological  
Order 0 7 1 2 5 6

queue 4, 8

	[ ]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
freqCount	0	0	0	0	0	0	0	0	0	0
Topological Order	0	7	1	2	5	6	4	8		
Queue	3	9								

[illegible]

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



- 1 Start
- 2 Discrete Math
- 3 Programming 1
- 4 Computer Organization
- 5 Programming 2
- 6 Operating Systems
- 7 Algorithms
- 8 Compilers

- 9 High level languages
- 10 Theory of Computation
- 11 Senior Seminar
- 12 end