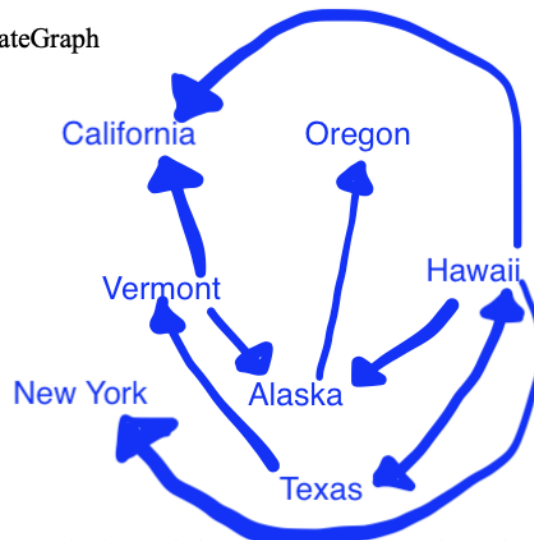


CMSC204
Kartchner

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

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?

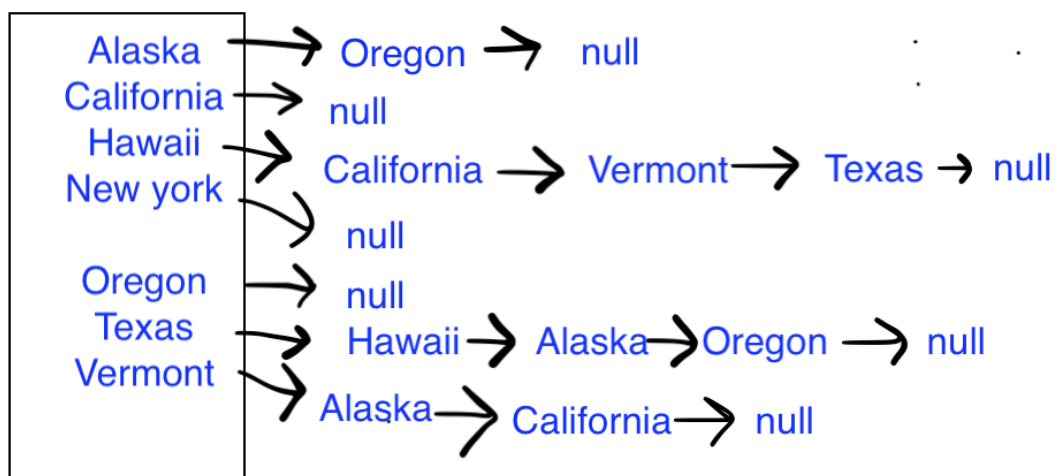
Texas has a path to Hawaii

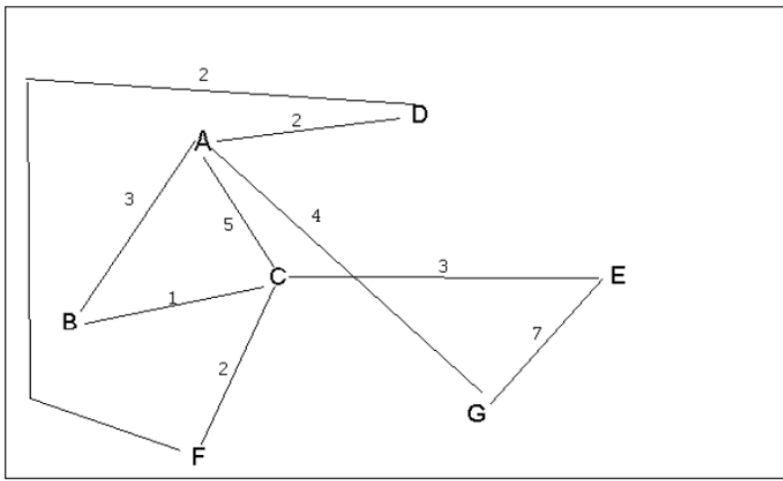
3. a. Show the adjacency matrix that would describe the edges in the graph.
Store the vertices in alphabetical order

States

Alaska	→	0	0	1	0	1	0	1
California	→	0	0	1	0	0	0	1
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	0	0	0	0	0
Vermont	→	0	0	1	0	0	0	1
	→	1	0	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?

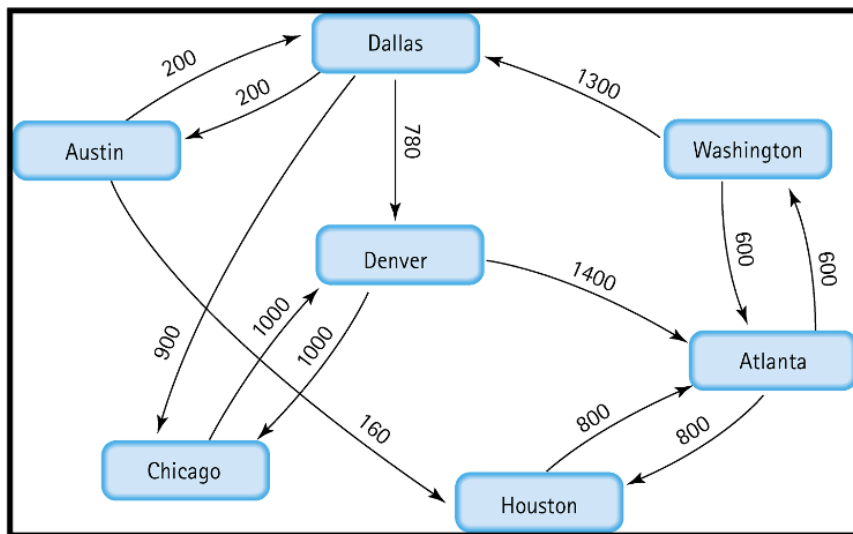
- A) E, G, F, C, D, B, A
- B) G, A, E, C, B, F, D
- C) E, G, A, D, F, C, B**
- D) E, C, F, B, A, D, G

C

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

A



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

Atlanta - Chicago: $600 + 1300 + 900 = 2800$

Atlanta - Denver: $600 + 1300 + 780 = 2680$

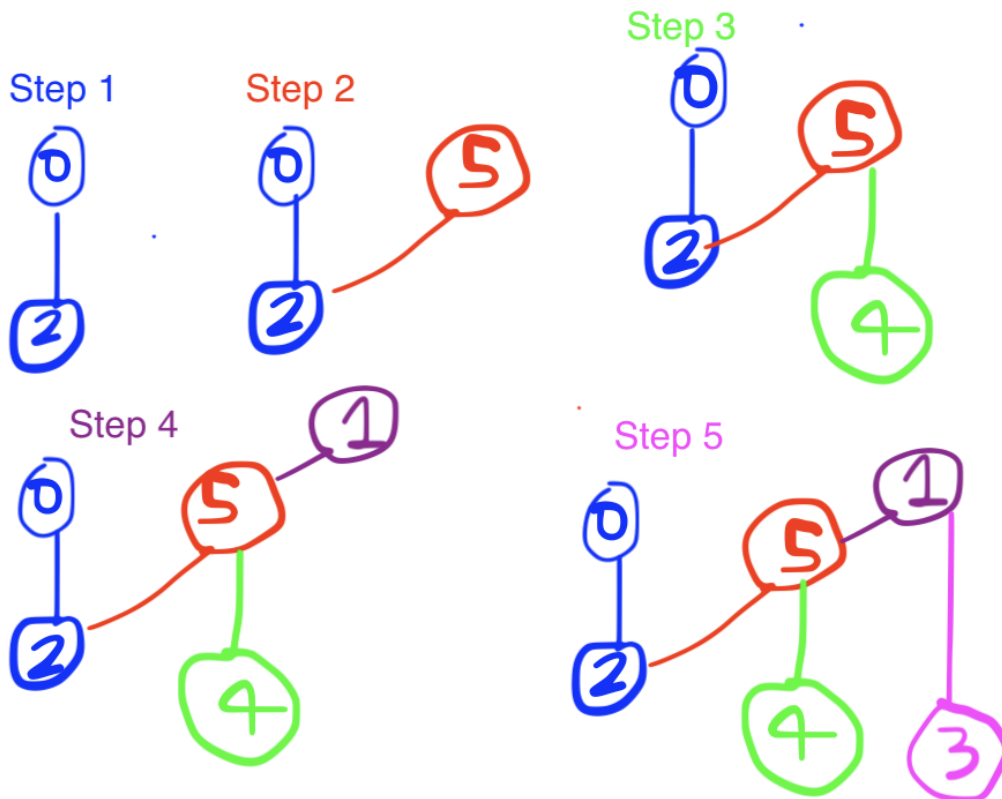
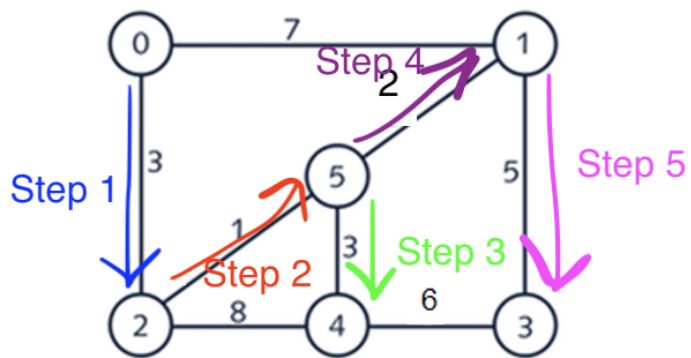
Atlanta - Austin: $600 + 1300 + 200 = 2100$

Atlanta - Washington: 600

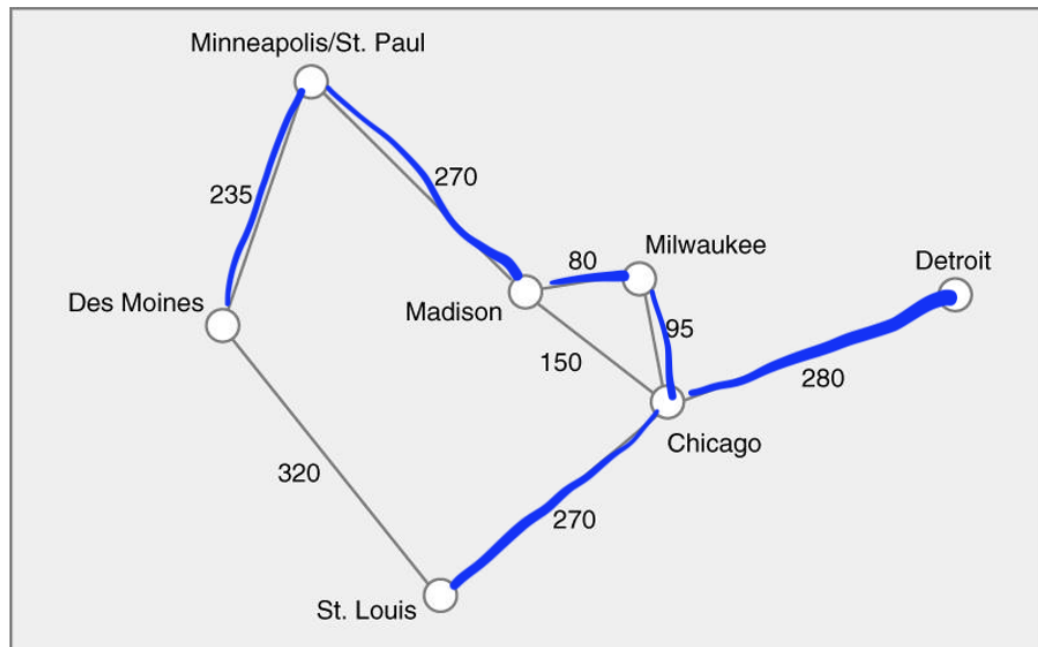
Atlanta - Houston: 800

Atlanta - Dallas: $600 + 1300 = 1900$

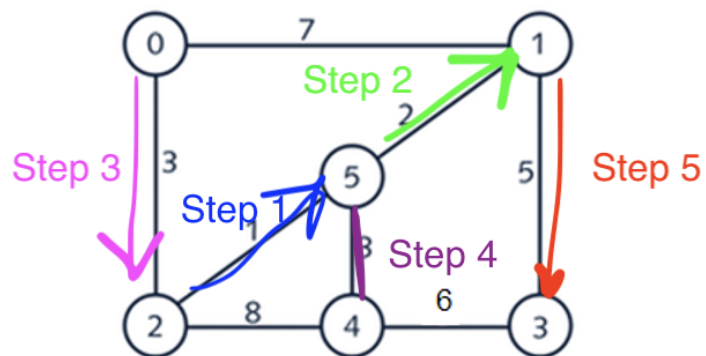
6. Find the minimal spanning tree using Prim's algorithm. Use 0 as the source vertex . Show the steps.



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



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



1) 2-5

2) 1-5

3) 0-2

4) 4-5

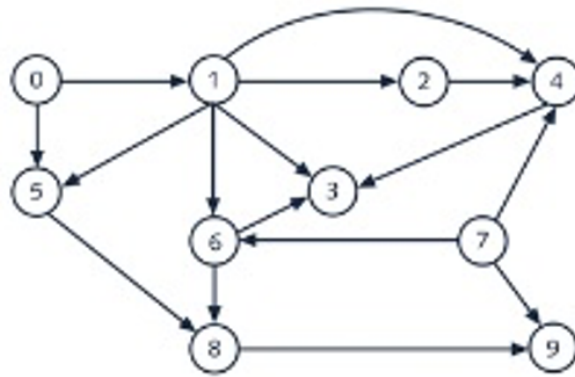
5) 1-3

6) 3-4

7) 0-1

8) 2-4

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



	0	1	2	3	4	5	6	7	8	9
PredCount:	0	0	0	0	0	0	0	0	0	0
Topological:	0	7	1	2	5	6	4	8	3	9
queue:	0	7	1	2	5	6	4	8	3	9

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

