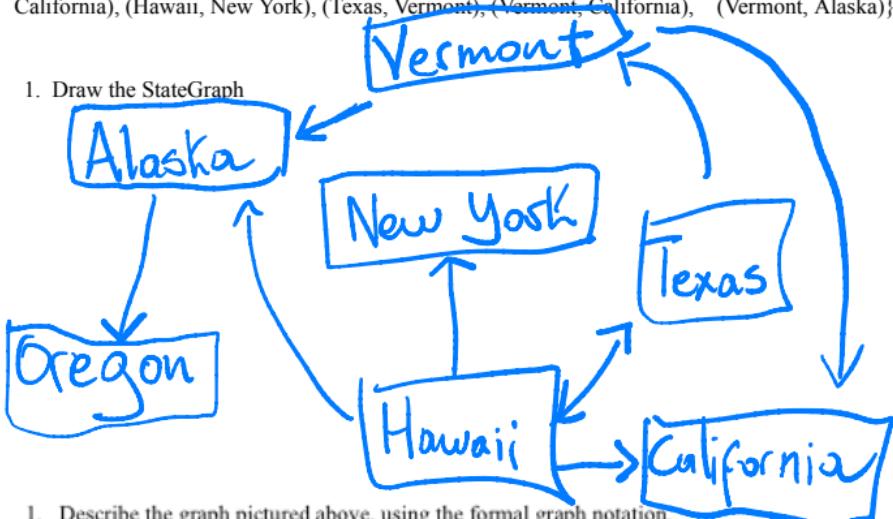


$$V(\text{StateGraph}) = \{\text{Oregon, Alaska, Texas, Hawaii, Vermont, New York, California}\}$$

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

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.

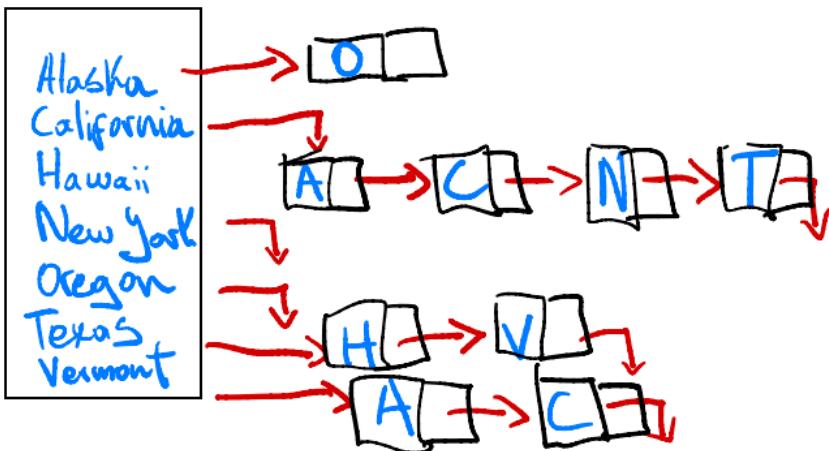
- c. From which state(s) in the graph is there a path to Hawaii?

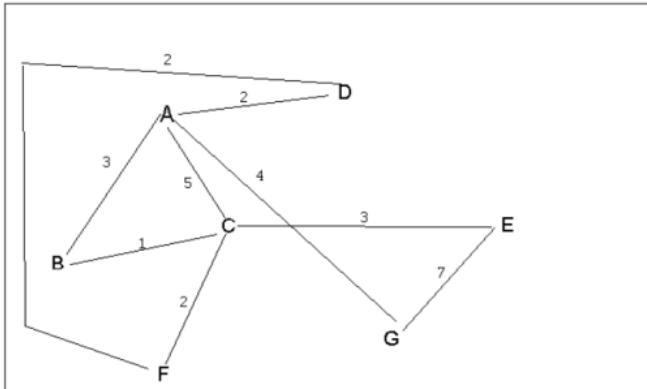
Texas.

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

States	A	C	H	N	O	T	V	
Alaska	0	0	0	0	1	0	0	
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	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?

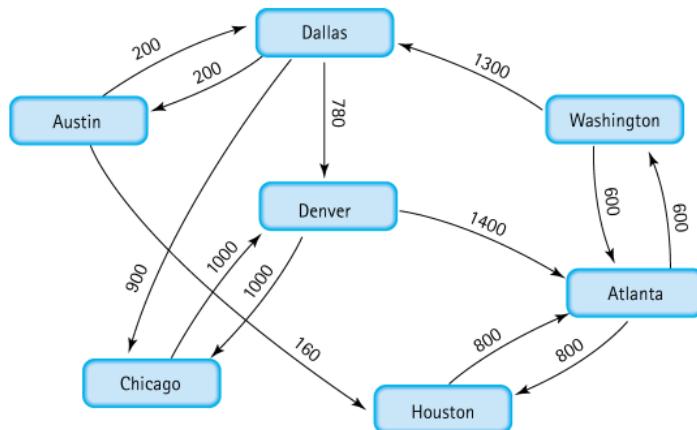
- A) E, G, F, C, D, B, A
- B) G, A, E, C, B, F, D
- C) E, G, A, D, F, C, B
- D) E, C, F, B, A, D, G

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

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

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



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

Atlanta, Washington (600)

Atlanta, Houston (800)

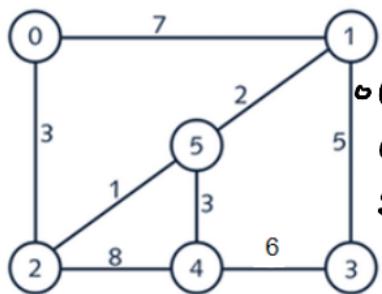
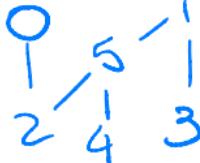
Atlanta, Dallas ($600 + 1300 = 1900$)

Atlanta, Austin ($600 + 1300 + 200 = 2100$)

Atlanta, Denver ($600 + 1300 + 787 = 2687$)
 $= (2680)$

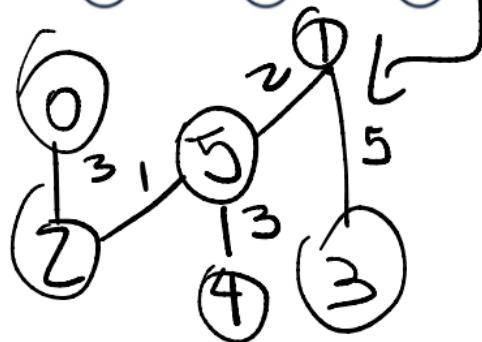
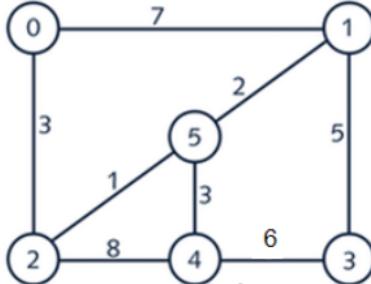
Atlanta, Chicago ($600 + 1300 + 900 = 2800$)

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



- add 0 to the tree,
- Consider edge 3,7,
Choose 3 because it's Smaller.
- add 2 to the tree.
- Consider edge 1,8, choose 1, because It is smaller.
- Add 5 to the tree.
- Consider edge 3,2, choose edge 2 because it's smaller
- Add 1 to the tree.
- Consider edge 5,3,6, add edges 5,3 to complete the minimum spanning tree.
- Add 4,3 to the tree.

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



2 to 5 (1)
1 to 5 (2)
0 to 2 (3)
4 to 5 (3)
1 to 3 (5)

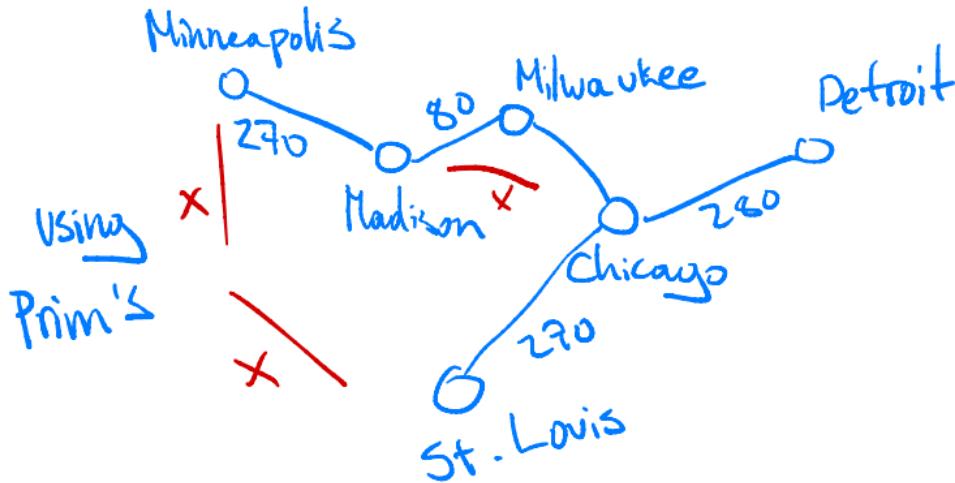
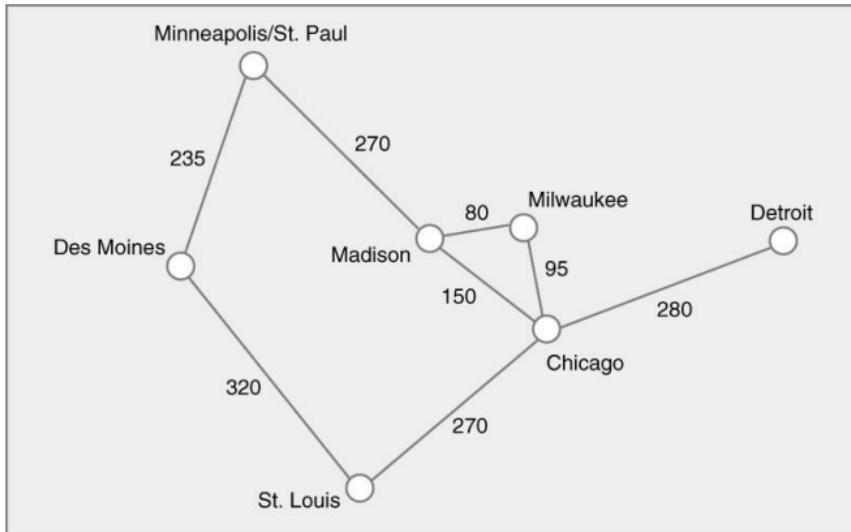
~~3 to 4 (6)~~

~~6 to 1 (7)~~

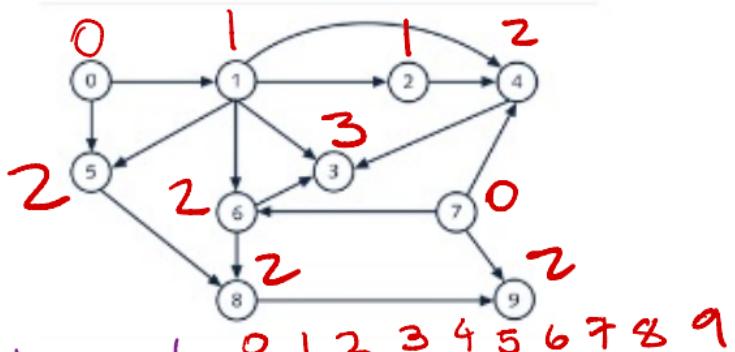
~~2 to 4 (8)~~

No need

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



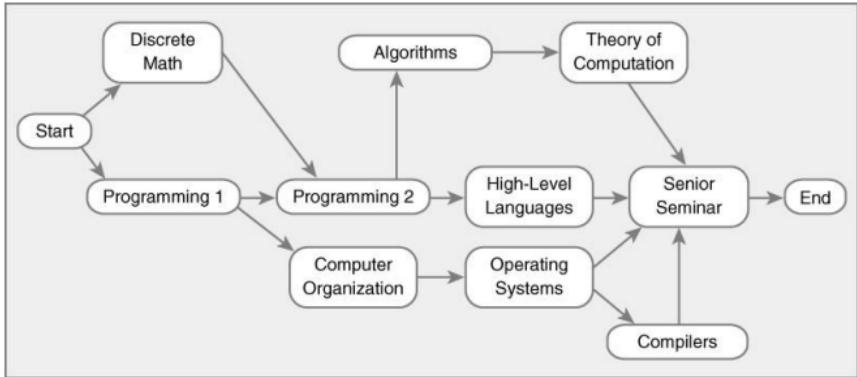
9. List the nodes of the graph in a breadth first topological ordering. Show the steps using arrays predCount, topologicalOrder and a queue



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.



Start
1

2 Discrete Math

3 Programming 1

4 computers
organization

5 Programming 2 6 Operating Systems

7 Algorithms 8 Compilers 9 high level
languages

10 Theory of Computation

11 Senior Seminar 12 End.