CMSC204
Kartchner
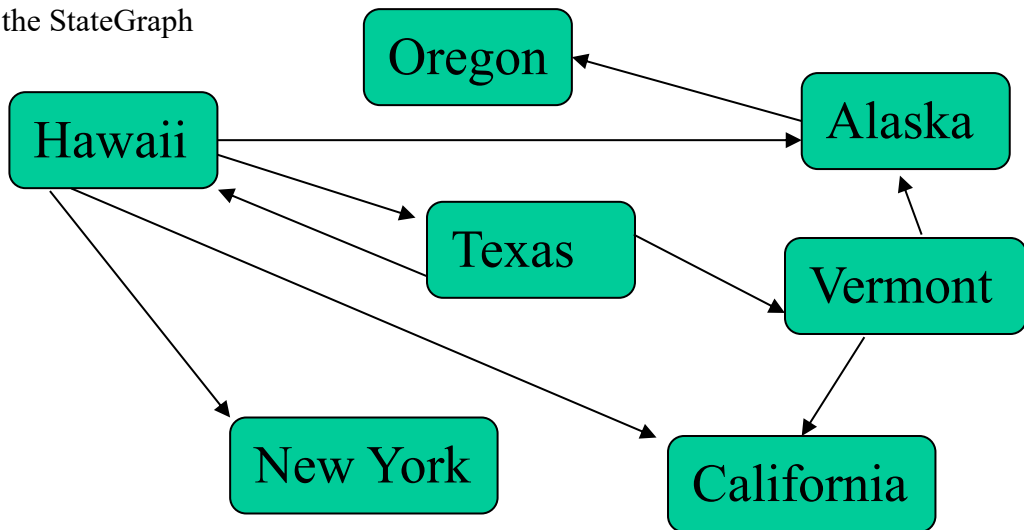
V(StateGraph) = {Oregon, Alaska, Texas, Hawaii, Vermont, NewYork, California}
E(StateGraph) = {(Alaska, Oregon), (Hawaii, Alaska), (Hawaii, Texas), (Texas, Hawaii), (Hawaii, California), (Hawaii, New York), (Texas, Vermont), (Vermont, California),   (Vermont, Alaska)}

1. Draw the StateGraph

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

    V(StateGraph) =   Not needed
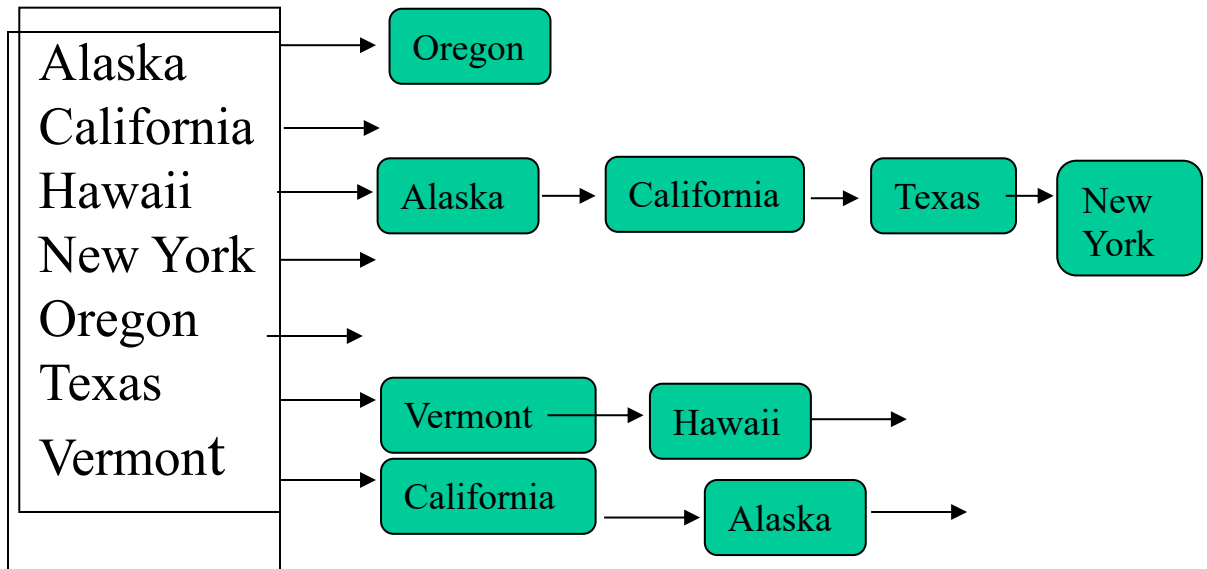
    E(StateGraph) =
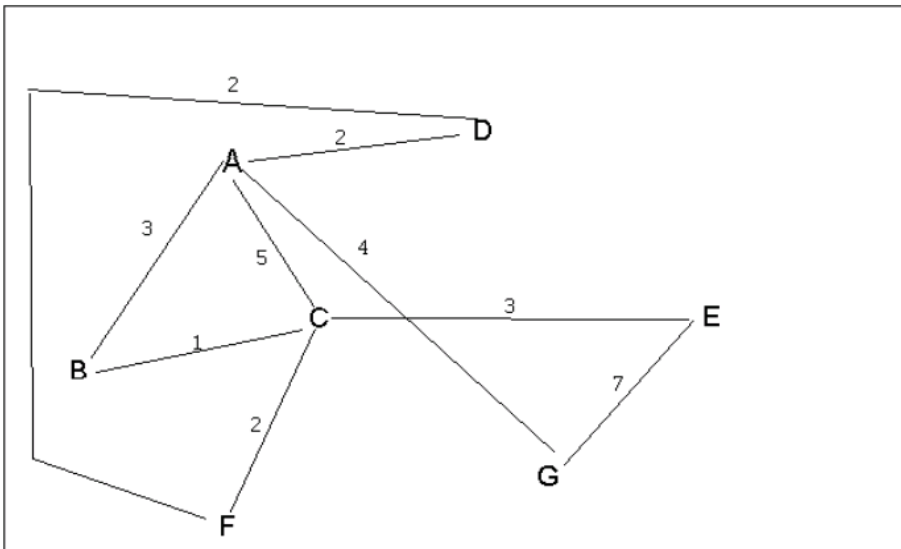
2. a. Is there a path from Oregon to any other state in the graph? No

    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	California	Hawaii	New York	Oregon	Texas	Vermont

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

Alaska → Oregon

California →

Hawaii → Alaska → California → Texas → New York

New York →

Oregon →

Texas → Vermont → Hawaii →

Vermont → California → Alaska →
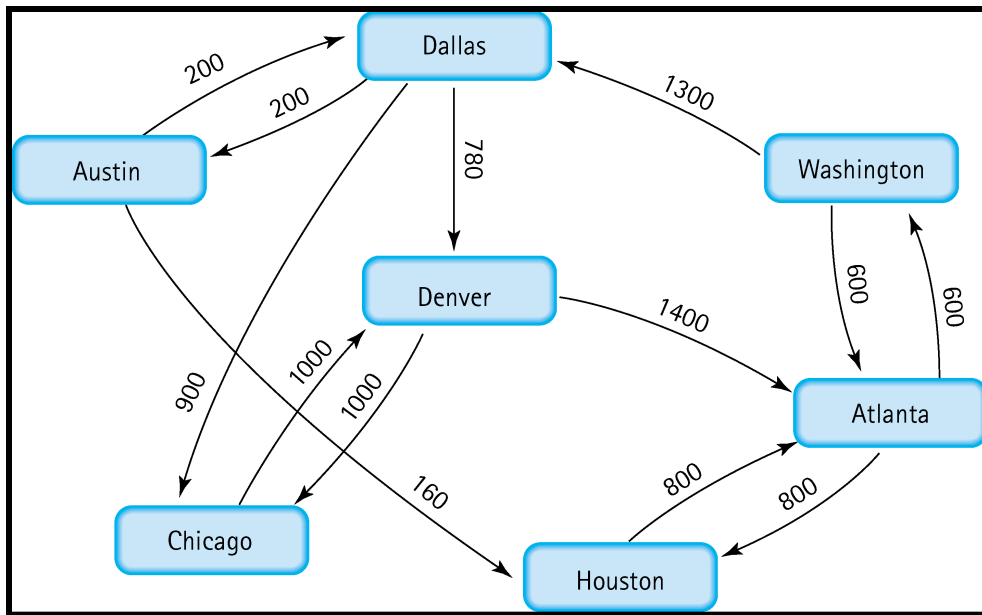
4 a. Which of the following lists the graph nodes in depth first order beginning with E?
A)   E, G, F, C, D, B, A
B)   G, A, E, C, B, F, D
C)   E, G, A, D, F, C, B
D)   E, C, F, B, A, D, G

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 <u>distance</u> from Atlanta to every other city

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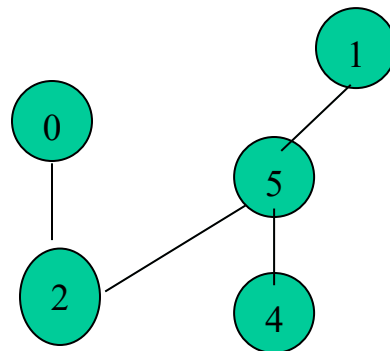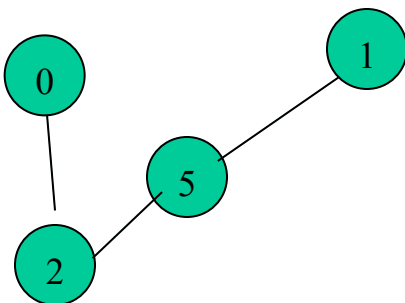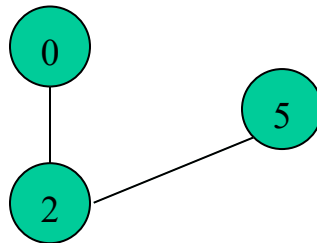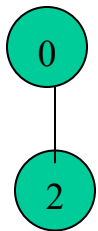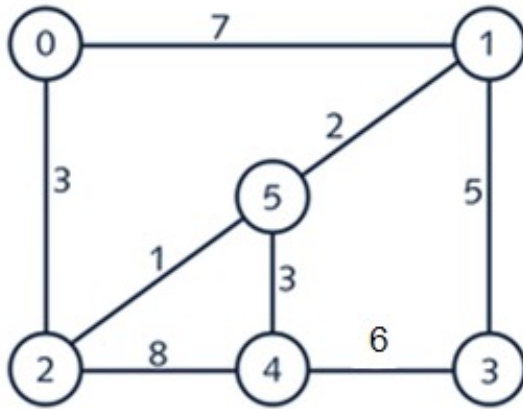   Atlanta → Chicago: 600 + 1300 + 900 = 2800
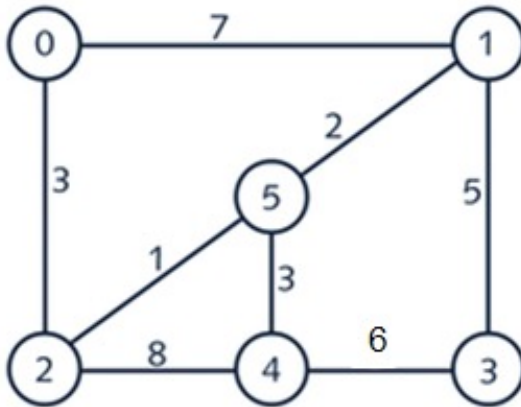   Atlanta →Dallas: 600 + 1300 = 1900
    Atlanta → Denver: 600 + 1300 + 780 = 2680
    Atlanta → Houston: 800
    Atlanta →Washington: 600

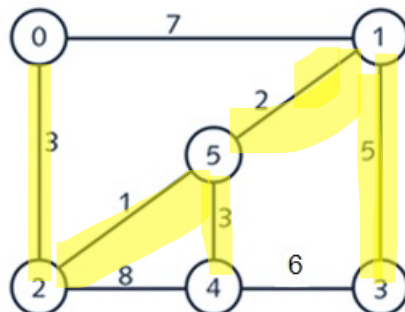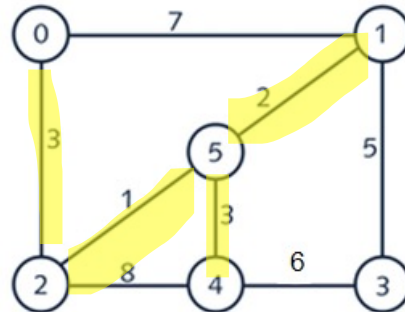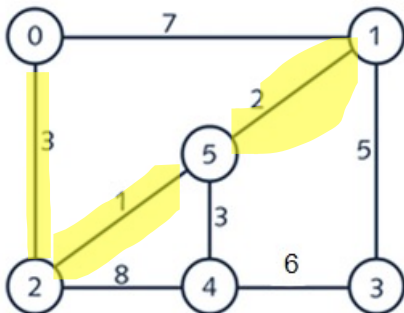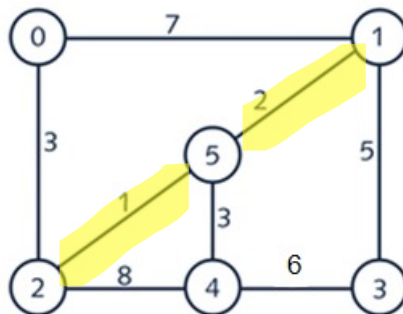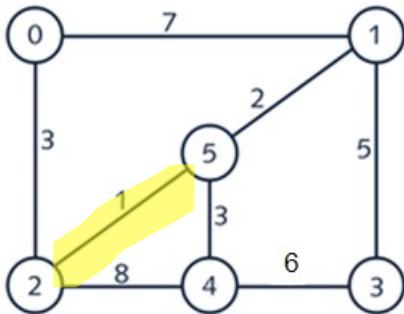6. Find the minimal spanning tree using Prim's algorithm. Use
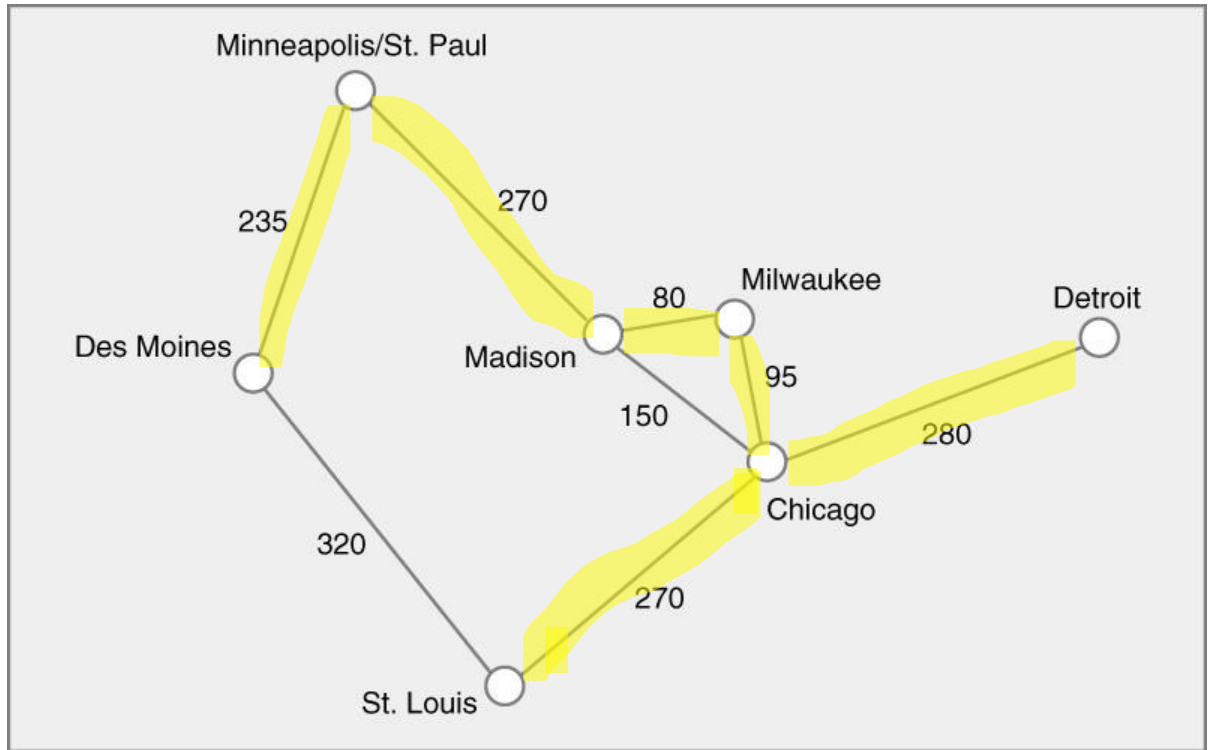   0 as the source vertex . Show the steps.
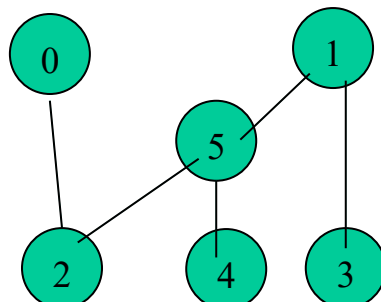
7. Find the minimal spanning tree using Kruskal's algorithm. Show the weights in order and the steps.

$2 \rightarrow 5 : 1$
$1 \rightarrow 5 : 2$
$0 \rightarrow 2 : 3$
$4 \rightarrow 5 : 3$
$1 \rightarrow 3 : 5$

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

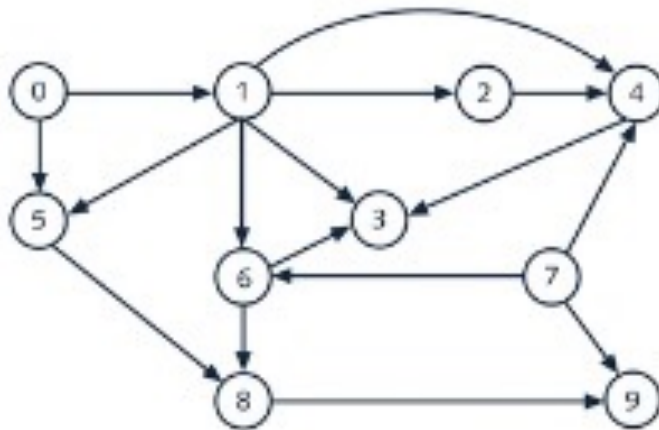Kruskal's Algorithm:
Madison →Milwaukee: 80
Milwaukee →Chicago: 95
Minneapolis →Des Moines: 235
Minneapolis →Madison: 270
Chicago →St. Louis: 270
Chicago →Detroit: 280

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

predCount	topologicalOrder	queue
0, 1, 1, 3, 3, 2, 2, 0, 2, 2		0, 7
0, 0, 1, 3, 3, 1, 2, 0, 2, 2	0	7, 1
0, 0, 1, 3, 2, 1, 1, 0, 2, 1	0, 7	1
0, 0, 0, 2, 1, 0, 0, 0, 2, 1	0, 7, 1	2, 5, 6
0, 0, 0, 2, 0, 0, 0, 0, 2, 1	0, 7, 1, 2	5, 6, 4
0, 0, 0, 2, 0, 0, 0, 0, 1, 1	0, 7, 1, 2, 5	6, 4
0, 0, 0, 1, 0, 0, 0, 0, 0, 1	0, 7, 1, 2, 5, 6	4,8
0, 0, 0, 0, 0, 0, 0, 0, 0, 1	0, 7, 1, 2, 5, 6, 4	8, 3
0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0, 7, 1, 2, 5, 6, 4, 8	3, 9
0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0, 7, 1, 2, 5, 6, 4, 8, 3	9
0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0, 7, 1, 2, 5, 6, 4, 8, 3, 9	

10. List the nodes of the graph in a breadth first topological ordering.
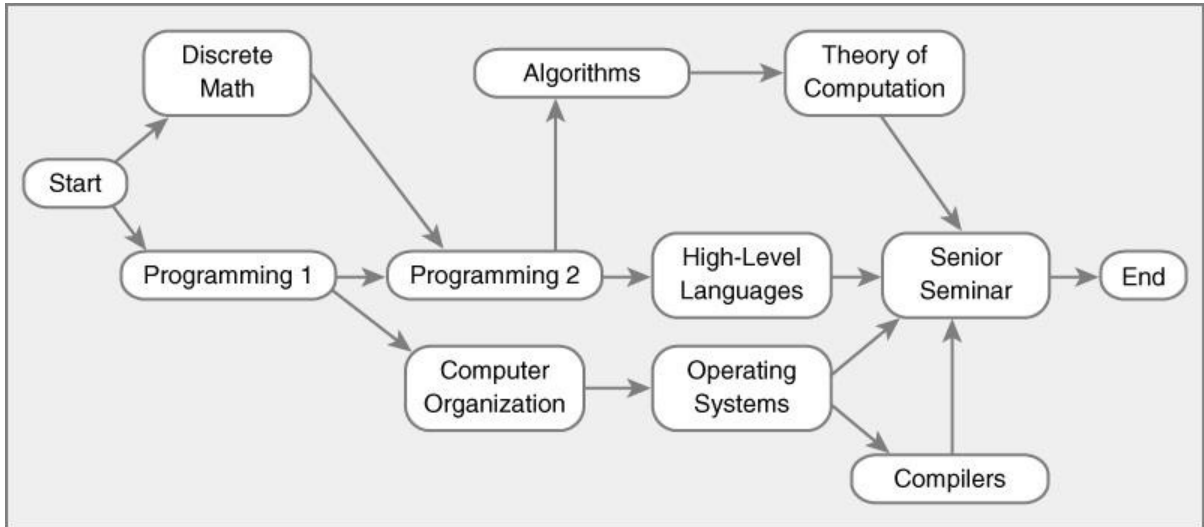
1. Start
2. Discrete Math
3. Programming 1
4. Computer Organization
5. Programming 2
6. Operating Systems
7. Algorithms
8. High-Level Languages
9. Compilers
10. Theory of Computation
11. Senior Seminar
12. End