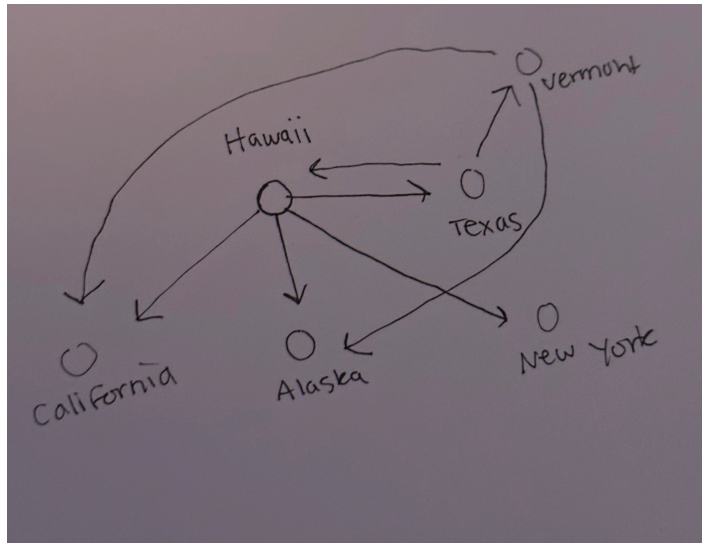V(StateGraph) = {Oregon, Alaska, Texas, Hawaii, Vermont, NewYork, California}
E(StateGraph) = {(Alaska, Oregon), (Hawaii, Alaska), (Hawaii, Texas), (Texas, Hawaii), (Hawaii, California), (Hawaii, New York), (Texas, Vermont), (Vermont, California),   (Vermont, Alaska)}

1. Draw the StateGraph

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

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

E(StateGraph) = (Alaska, Oregon), (Hawaii, Alaska), (Hawaii, Texas), (Texas, Hawaii),
(Hawaii, California), (Hawaii, New York), (Texas, Vermont),
(Vermont, California), (Vermont, Alaska)}

2. a. Is there a path from Oregon to any other state in the graph?

Yes, there's a path from Alaska to Oregon for example

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

Yes, Hawaii is connected to every other state

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

Only from Texas

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

States

| 1. Alaska |
| 2. California |
| 3. Hawaii |
| 4. New York |
| 5. Oregon |
| 6. Texas |
| 7. Vermont |

1. Oregon

3. Alaska　　California　　New York　　Texas

6. Hawaii　　Vermont

7. Alaska　　California

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

1. Alaska:[Oregon]

2. Hawaii:[Alaska, California, New York, Texas]

3. Texas:[Hawaii, Vermont]

4. Vermont:[Alaska, California]
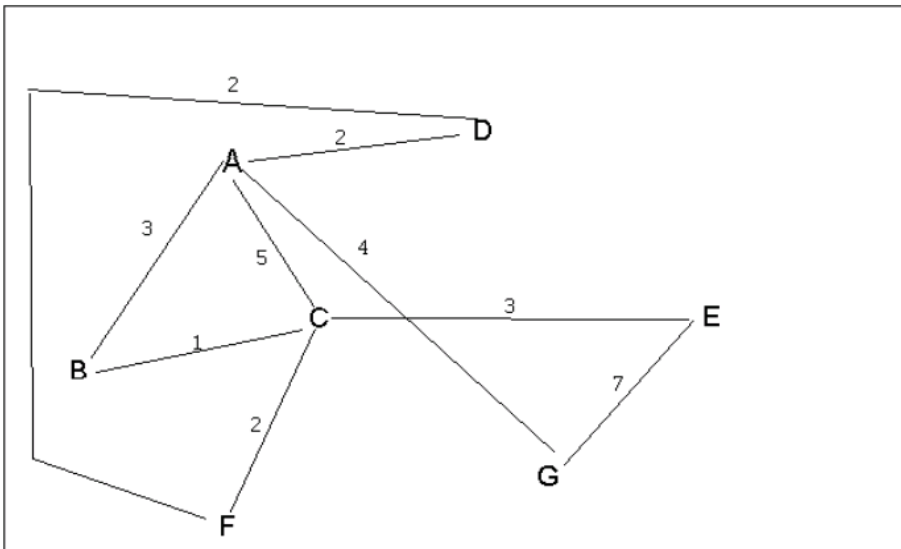
4 a. Which of the following lists the graph nodes in depth first order beginning with E?

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

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

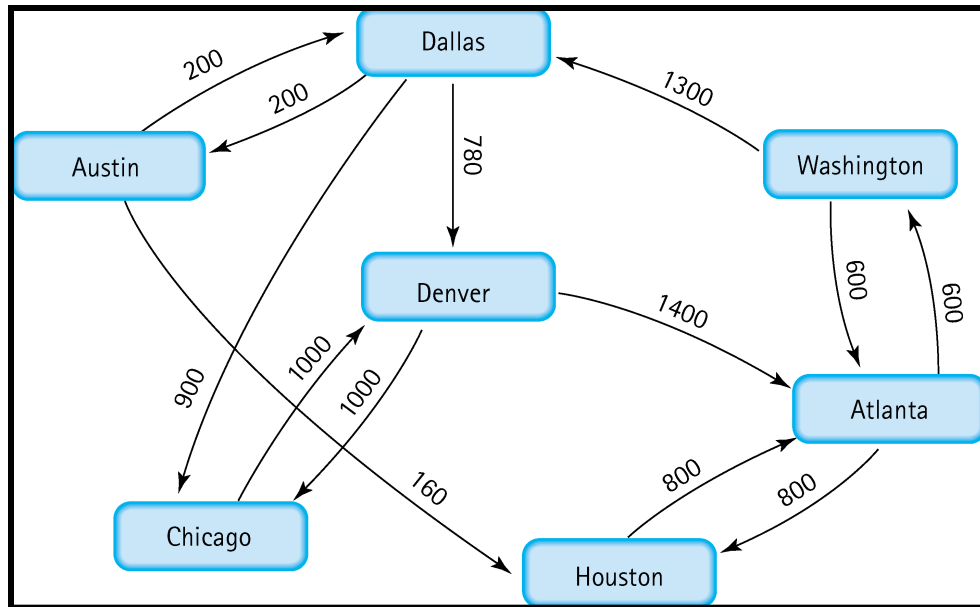## C) E, G, A, D, F, C, B

    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

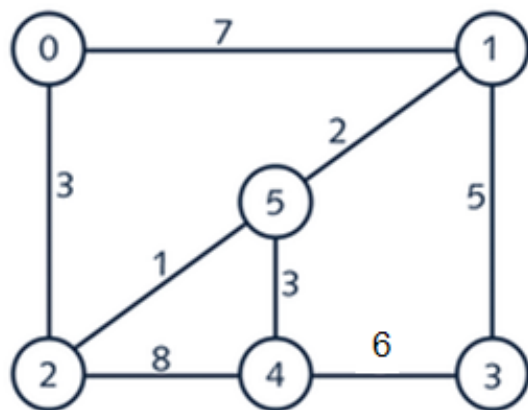Atlanta -> Houston (800)
Atlanta -> Washington (600)
Atlanta -> Dallas (1900)
Atlanta -> Denver (2680)
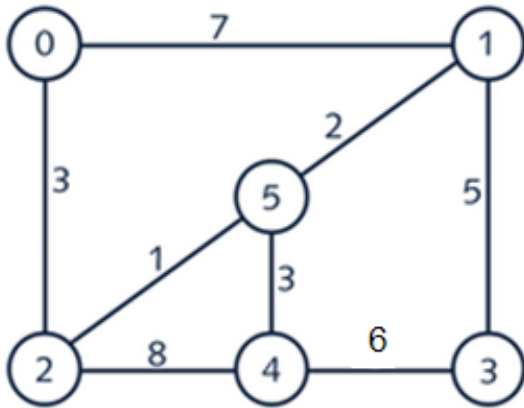Atlanta -> Austin (2100)
Atlanta -> Chicago (2800)

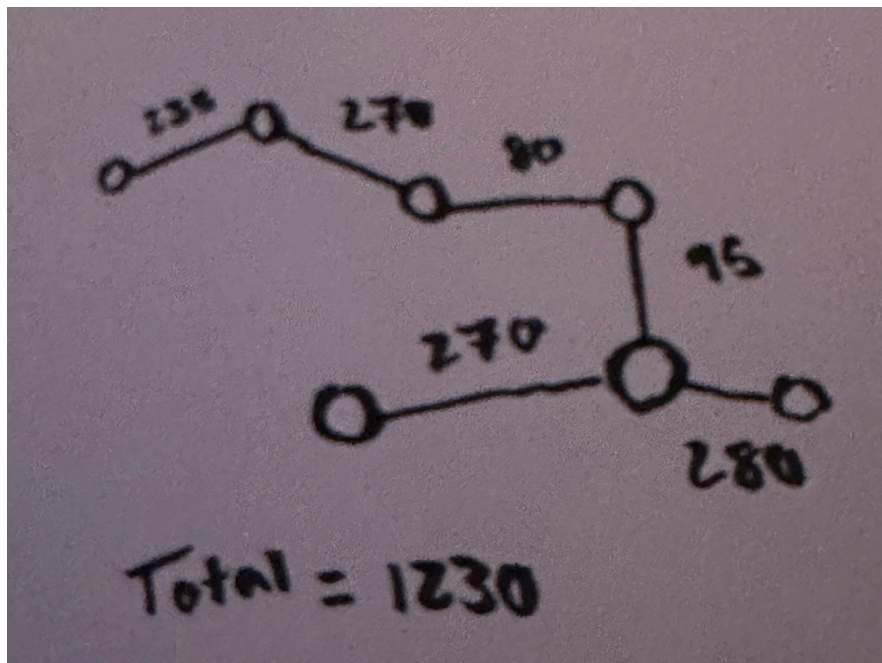6. Find the minimal spanning tree using Prim's algorithm. Use 0 as the source vertex . Show the steps.
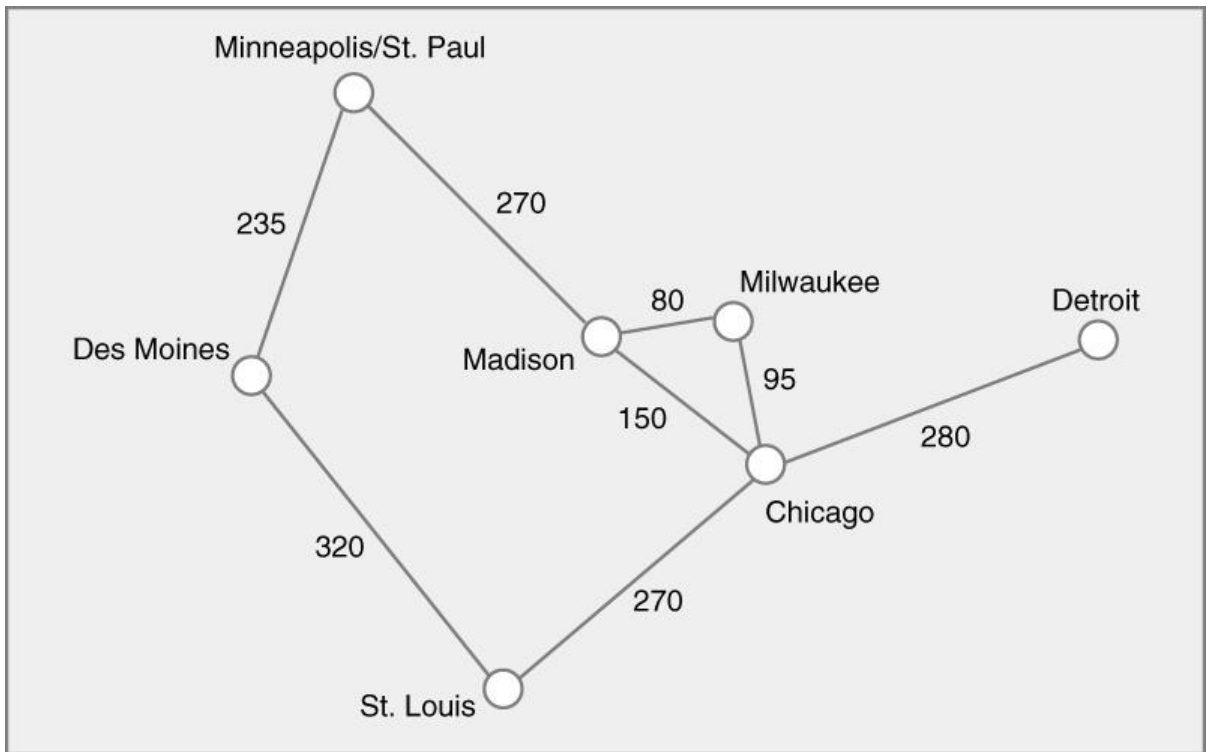

0 -> 2 -> 5 -> 1 -> 3 -> 4

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

1) 5 -> 2 (weight 1)
2) 5 -> 1 (weight 2)
3) 5 -> 4 (weight 3)
4) 2 -> 0 (weight 3)
5) 1 -> 3 (weight 5)

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

Minneapolis/St. Paul

235

270

80   Milwaukee

Des Moines   Madison   95   Detroit

150

320   280

270   Chicago

St. Louis

235   270

80

95

270

280

Total = 1230

9. List the nodes of the graph in a breadth first topological ordering. Show the
   steps using arrays predCount, topologicalOrder and a queue
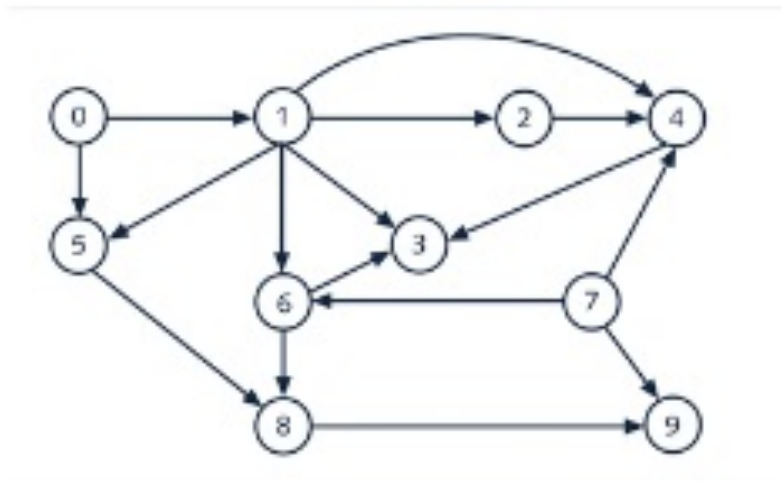
10. List the nodes of the graph in a breadth first topological ordering.
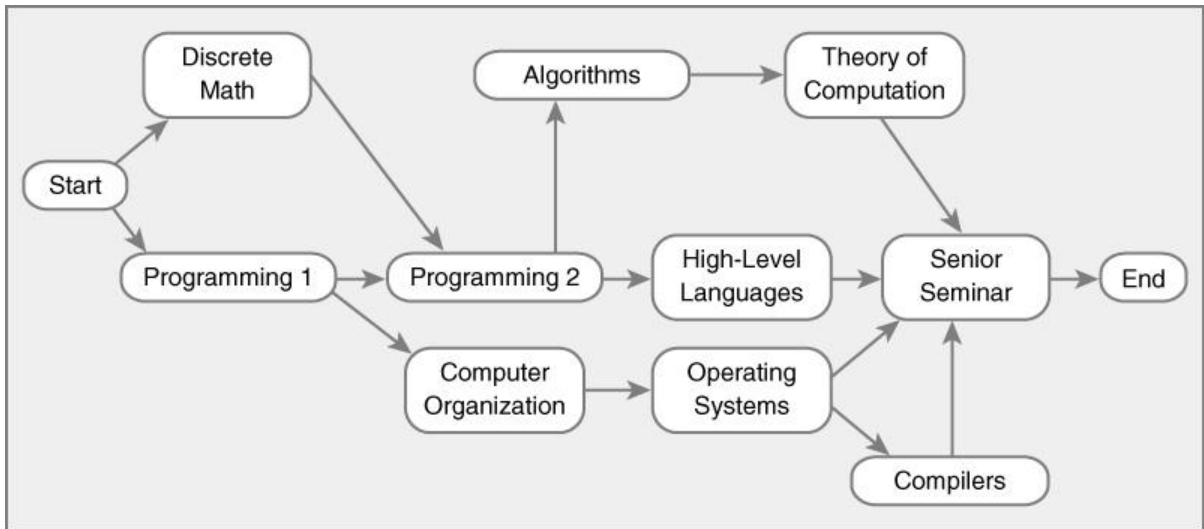
     A. Start
     B. Discrete Math
     C. Programming 1
     D. Programming 2
     E. Computer Organization
     F. Algorithms
     G. High-Level Languages
     H. Operating Systems
     I.   Theory Computation
     J. Senior Seminar
     K. Compilers
     L. End