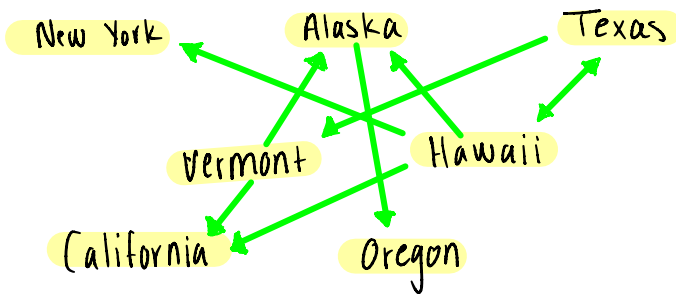


CMSC204
Kartchner

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

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

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?

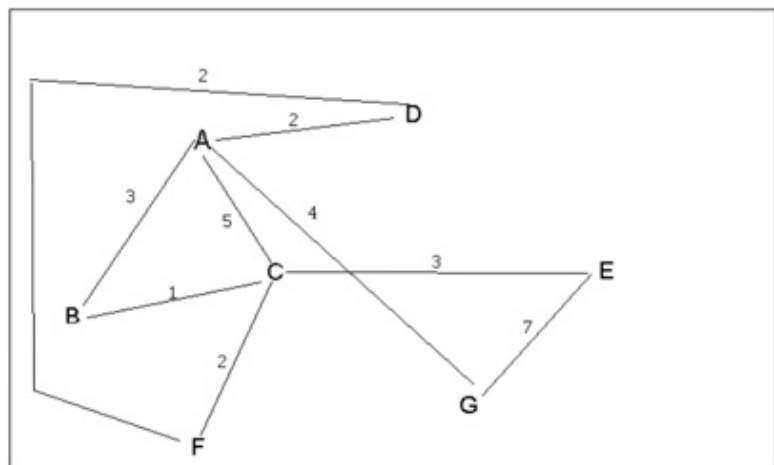
There is a path from Texas

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

States								
Alaska	→	0	0	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		1	0	0	1
Vermont	→	1	0	0	0	0	0	0

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

Alaska	→ Oregon → null
California	→ null
Hawaii	→ California → Vermont → Texas → Null
New York	→ Null
Oregon	→ Null
Texas	→ Hawaii → Alaska → Oregon → Null
Vermont	→ Alaska → California → Null

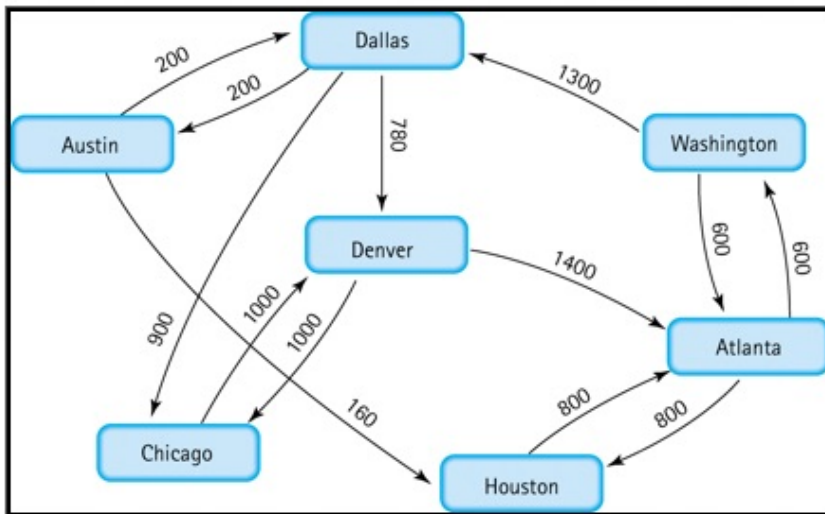


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

- 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

$$\text{Atlanta} - \text{Chicago} : 600 + 1300 + 900 = 2800$$

$$\text{Atlanta} - \text{Denver} : 600 + 1300 + 780 = 2680$$

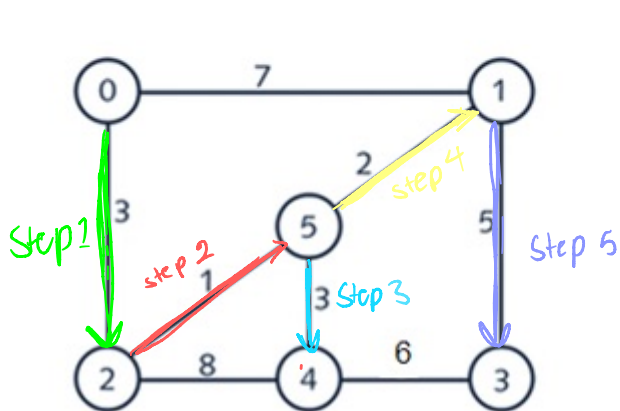
$$\text{Atlanta} - \text{Austin} : 600 + 1300 + 200 = 2100$$

$$\text{Atlanta} - \text{Washington} : 600$$

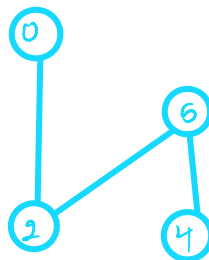
$$\text{Atlanta} - \text{Houston} : 800$$

$$\text{Atlanta} - \text{Dallas} : 600 + 1300 = 1900$$

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



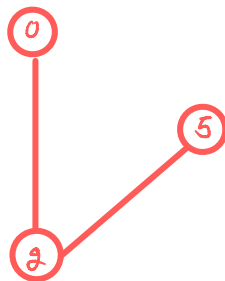
Step 3



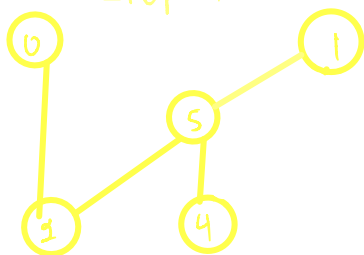
Step 1



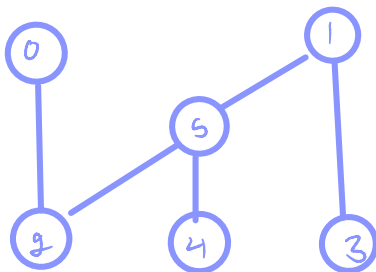
Step 2



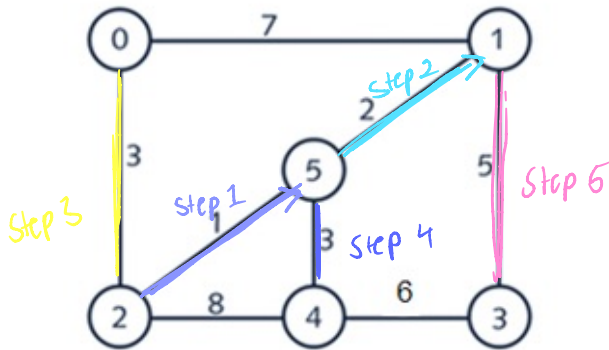
Step 4



Step 5



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

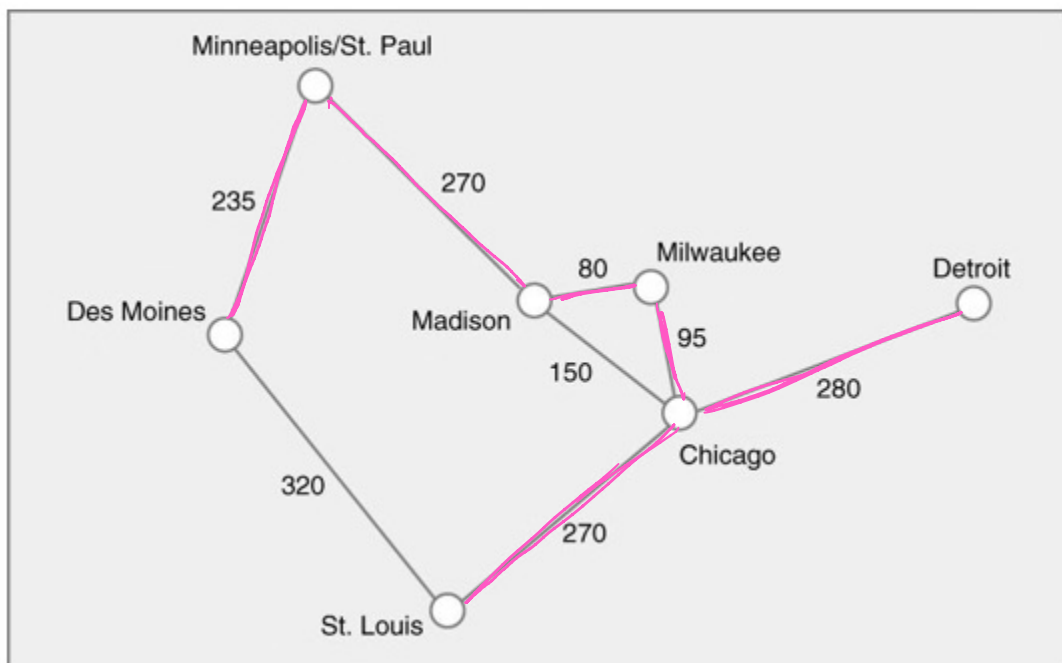
5) 1-3

6) 3-4

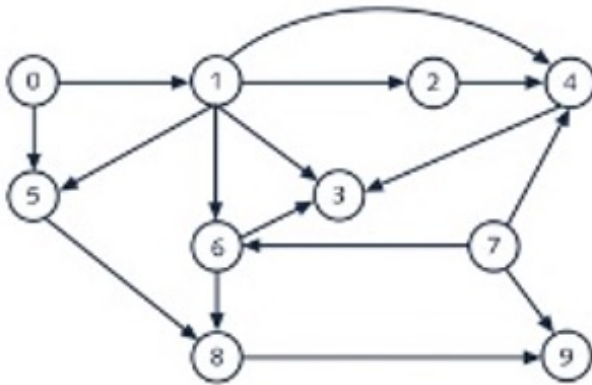
7) 0-1

8) 2-4

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

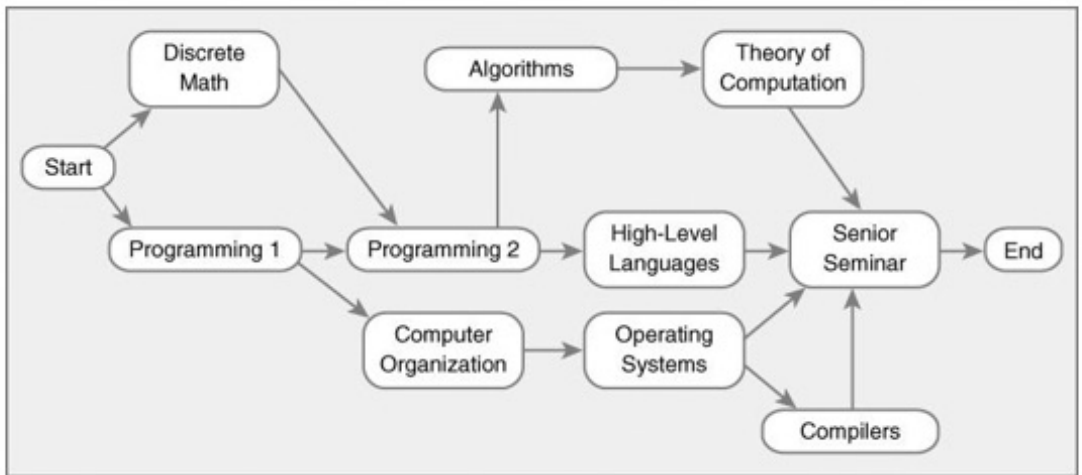


PredCount: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
 0 0 0 0 0 0 0 0 0 0

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.



start



Discrete Math



Programming 1



Computer Organization



Programming 2



Operating System

Algorithms



High Level Languages



Compilers



Theory of computation



End