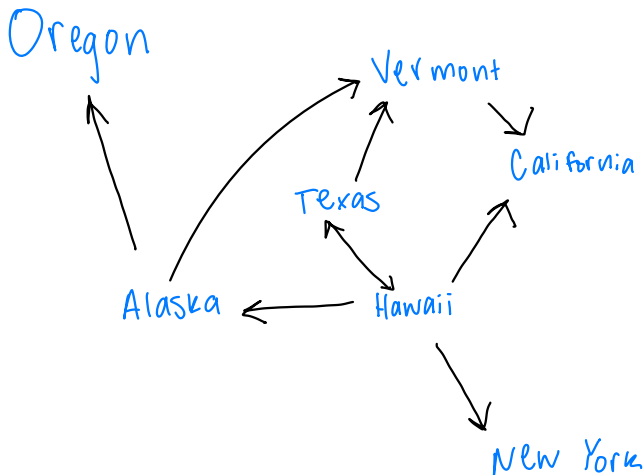


$V(\text{StateGraph}) = \{\text{Oregon, Alaska, Texas, Hawaii, Vermont, New York, California}\}$

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

1. Draw the StateGraph



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

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

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

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?

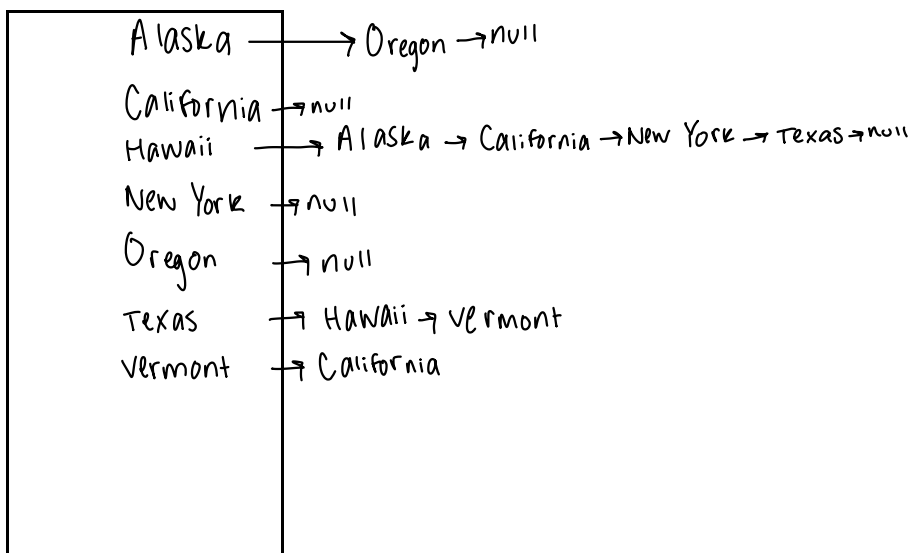
Texas

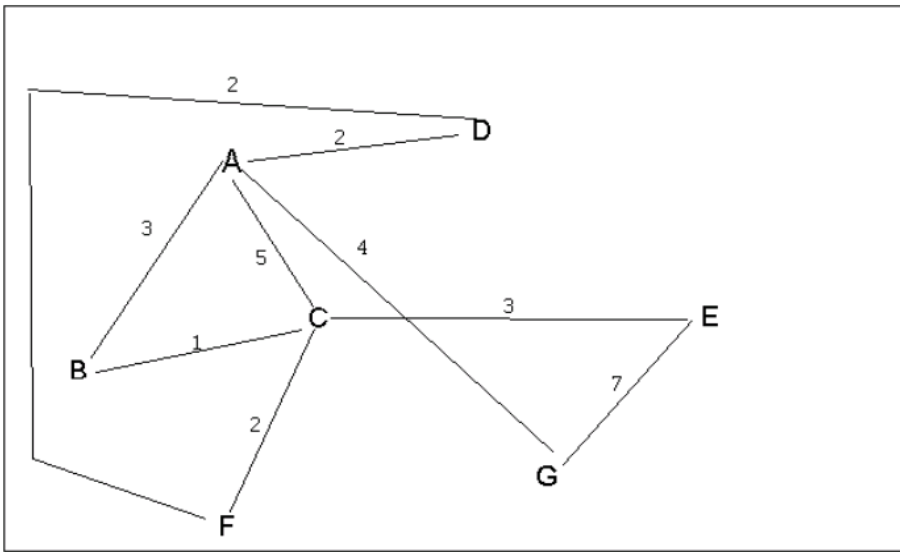
1. a. Show the adjacency matrix that would describe the edges in the graph.
Store the vertices in alphabetical order

States

| | Alaska | California | Hawaii | New York | Oregon | Texas | Vermont |
|------------|--------|------------|--------|----------|--------|-------|---------|
| Alaska | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| California | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 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 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

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



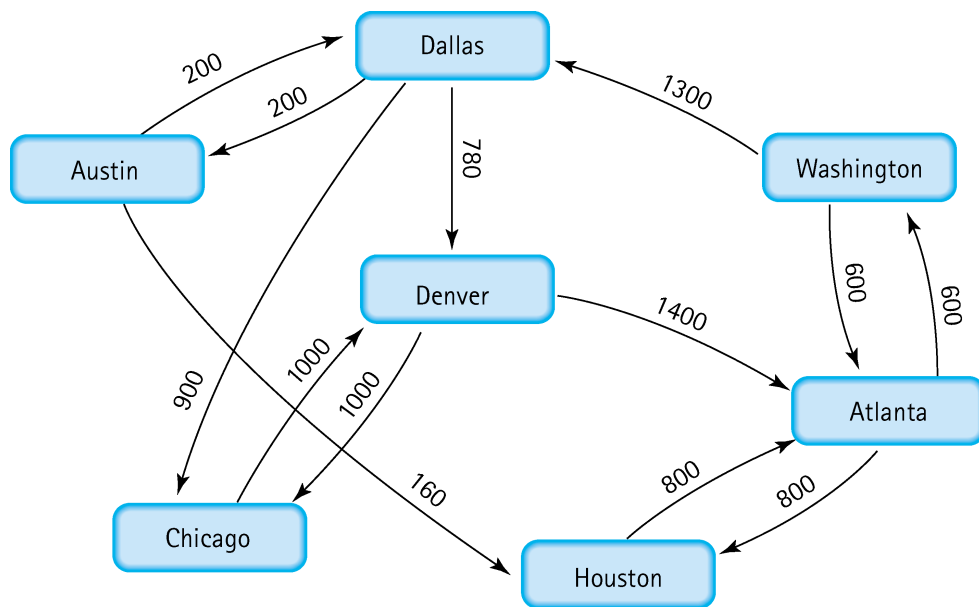


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

- 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

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

Atlanta → Houston = 800

Atlanta → Chicago = 2800

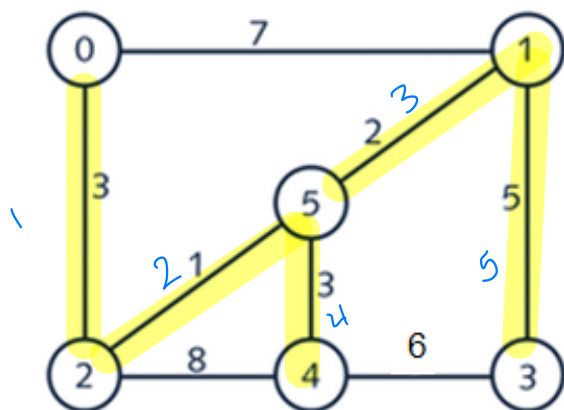
Atlanta → Dallas = 1900

Atlanta → Austin = 2100

Atlanta → Denver = 2680

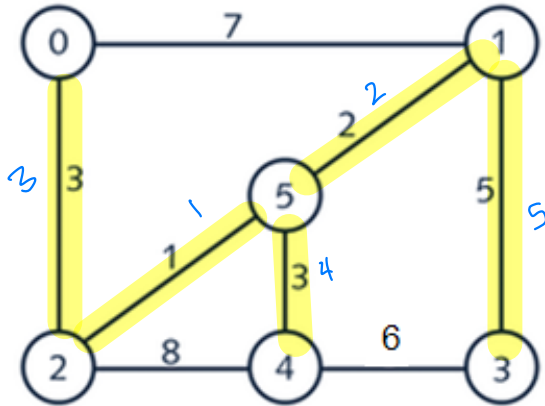
Atlanta → Washington = 600

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



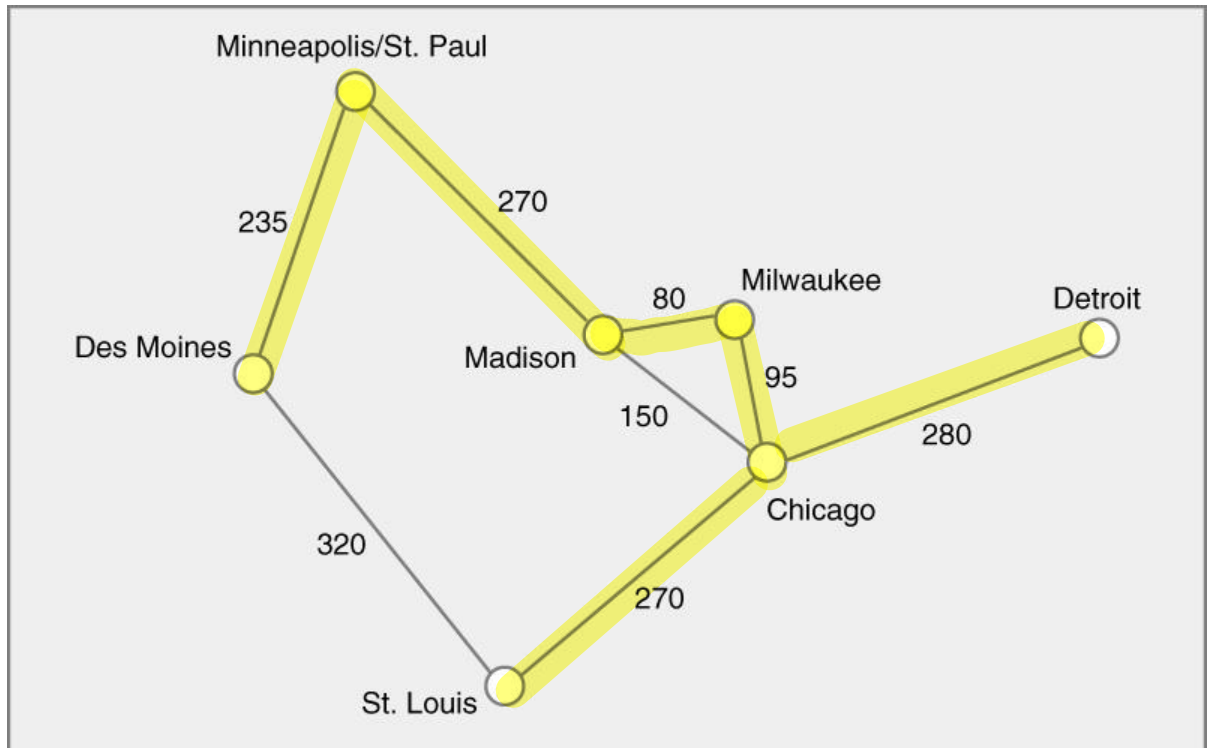
Steps

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

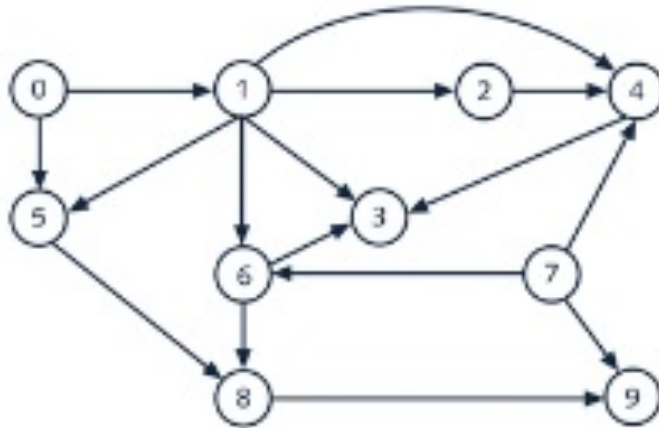


$2-5 (1)$
 $1-5 (2)$
 $0-2 (3)$
 $4-5 (3)$
 $1-3 (5)$

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

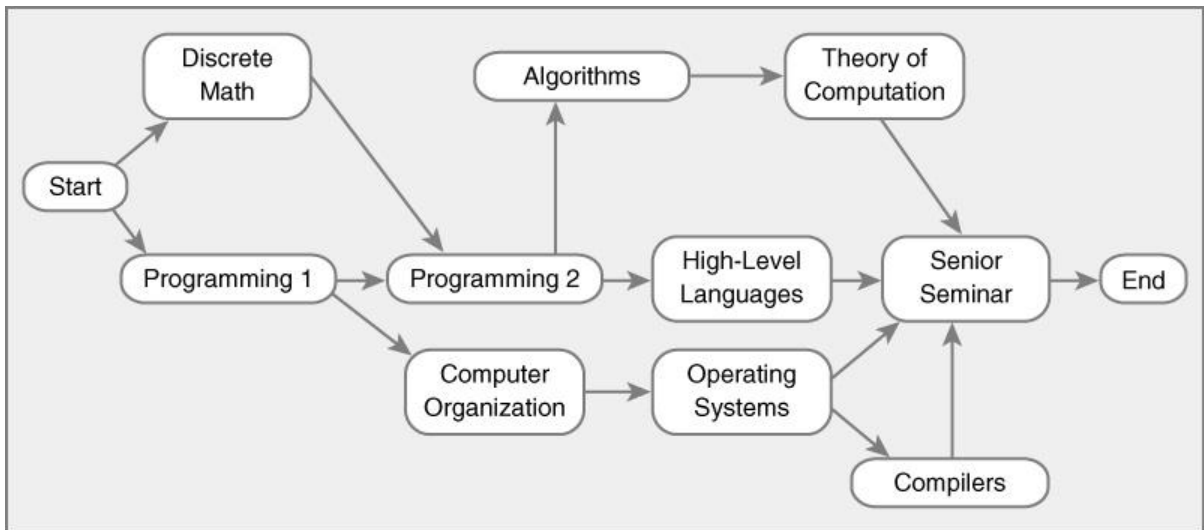


9. List the nodes of the graph in a breadth first topological ordering. Show the steps using arrays predCount, topologicalOrder and a queue



0 → 1 → 2 → 4 → 5 → 3 → 6 → 7 → 8 → 9

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



Start
Discrete Math
Programming 1
Programming 2
Computer Organization
Algorithms
High Level Languages
Operating Systems
Theory of Computation
Senior Seminar
End