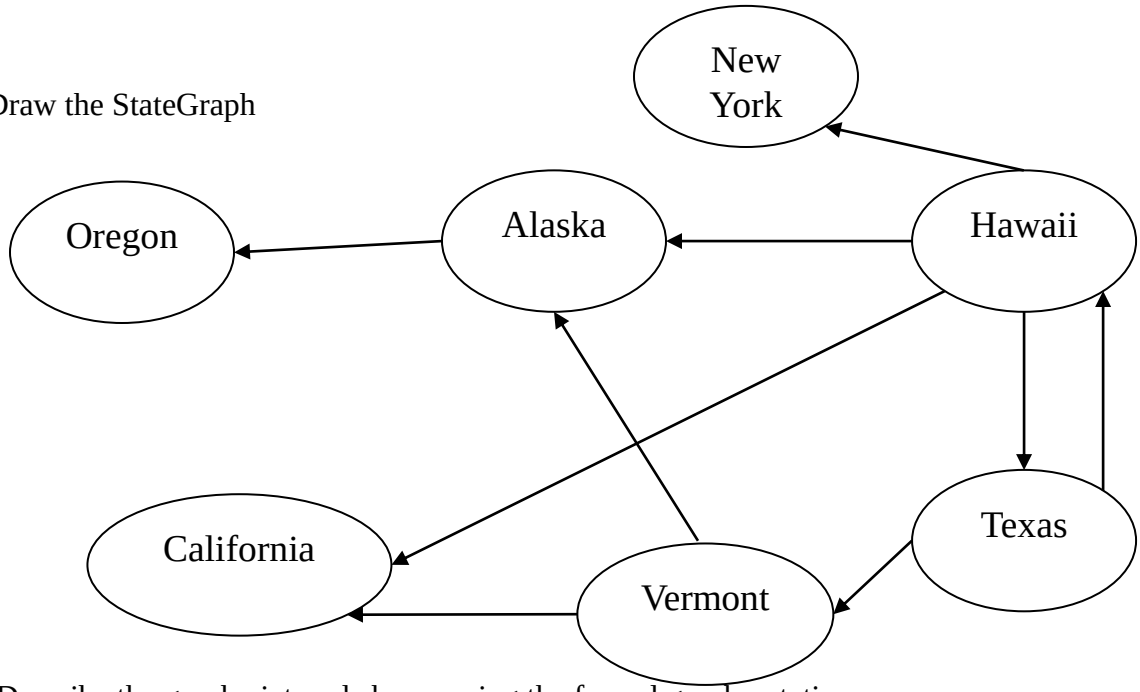
CMSC204
Kartchner

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) = {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)}

2. a. Is there a path from Oregon to any other state in the graph? **NO**

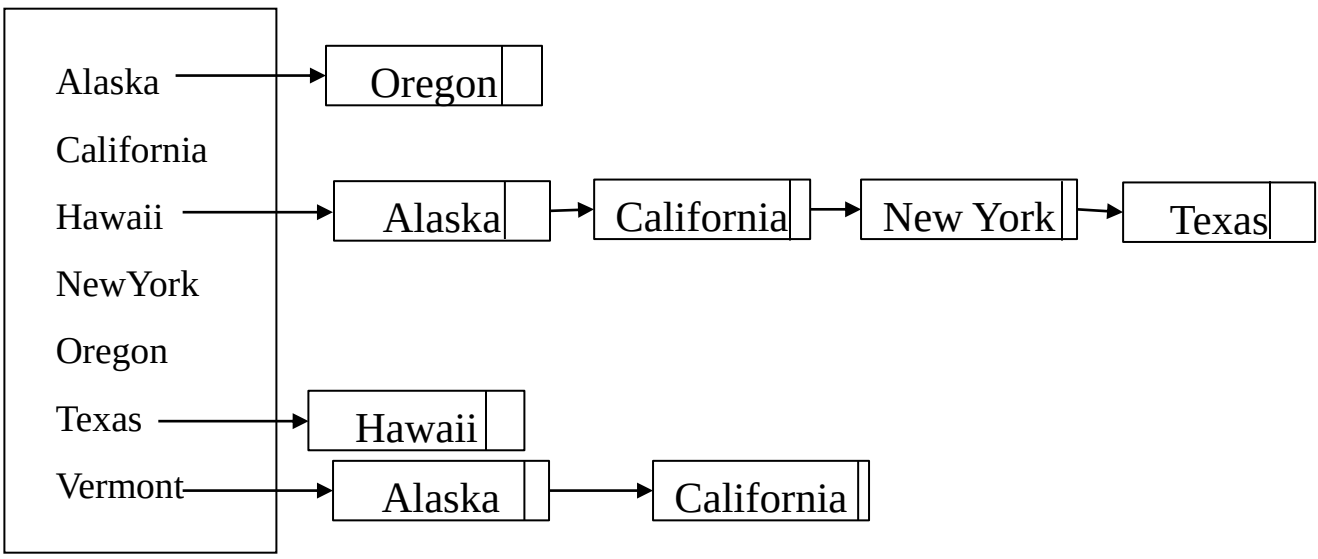
   b. Is there a path from Hawaii to every other state in the graph? **NO**

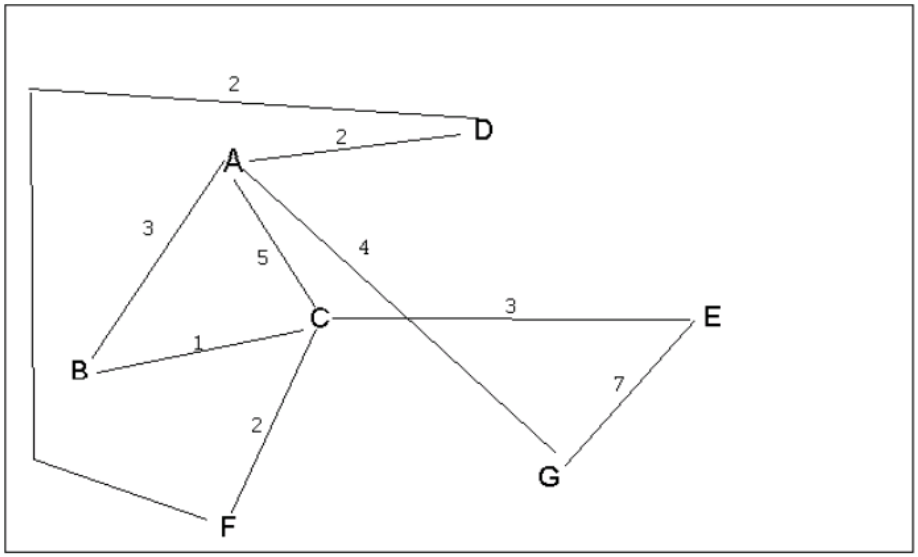
   c. From which state(s) in the graph is there a path to Hawaii? **Texas**

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

States	AK	CA	HI	NY	OR	TX	VT
Alaska	0	0	0	0	1	0	0
California	0	0	0	0	0	0	0
Hawaii	1	1	0	1	0	1	0
NewYork	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



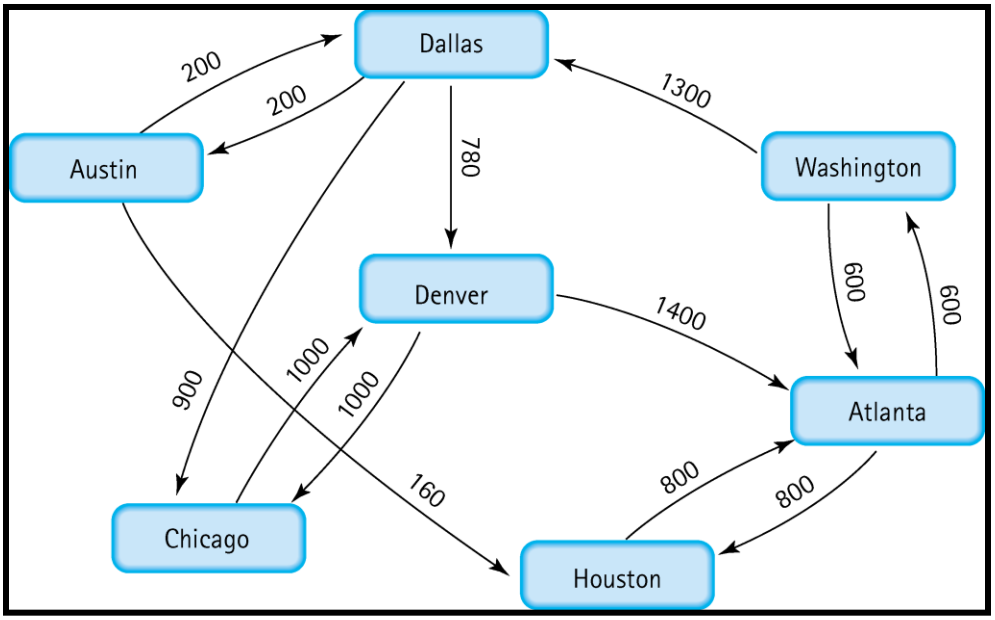


4 a. Which of the following lists the graph nodes in depth first order beginning with E? **C**

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**

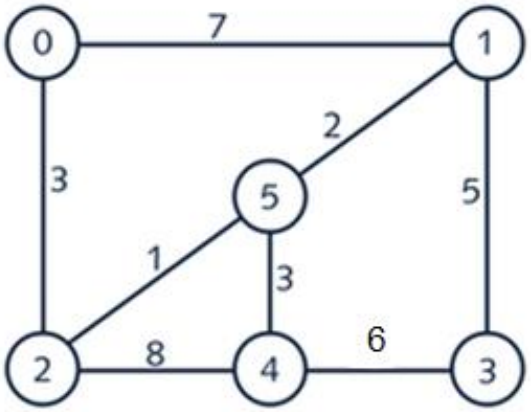
A) F, C, D, A, B, E, G
B) F, D, C, A, B, C, G
C) F, C, D, B, G, A, E
D) a, b, and c are all breadth first traversals

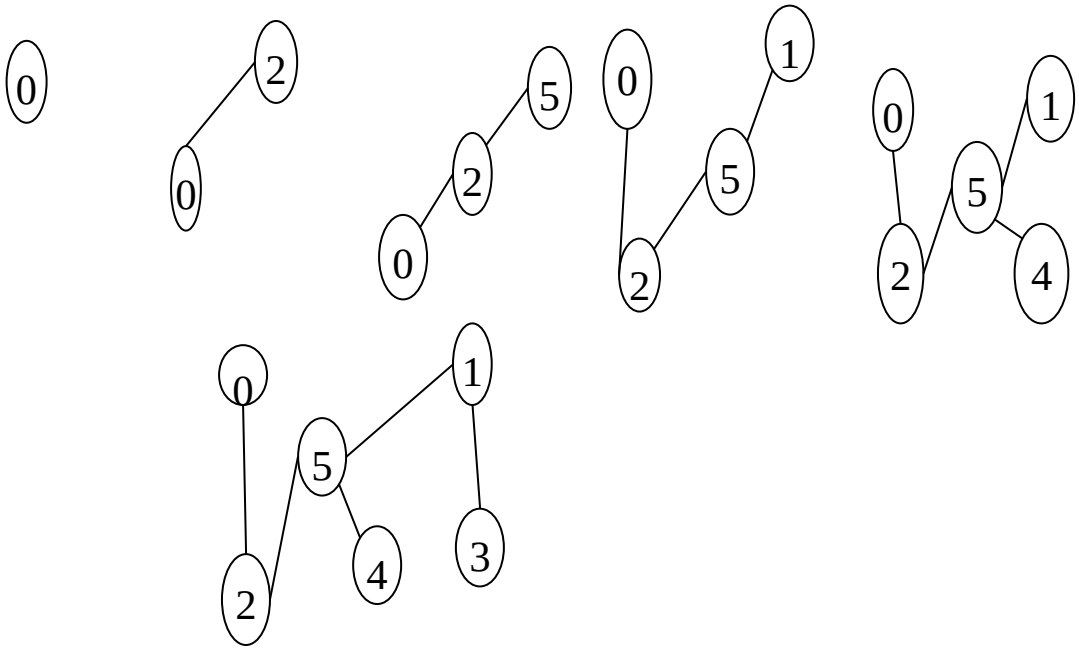


5. Find the shortest <u>distance</u> from Atlanta to every other city

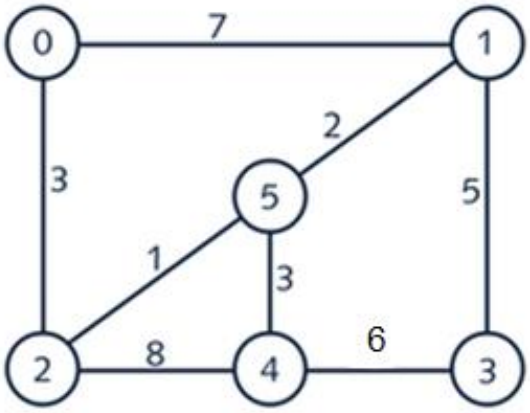
Atlanta-Austin: Atlanta->Washington->Dallas->Austin =600+1300+200=**2100**
Altanta-Chicago: Atlanta->Washington->Dallas->Chicago=600+1300+900=**2800**
Altanta-Dallas: Atlanta->Washington->Dallas=600+1300=**1900**
Altanta-Denver: Atlanta->Washington->Dallas->Denver: 600+1300+780=**2680**
Altanta-Houston=**800**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

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

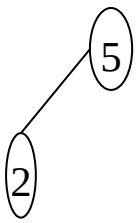


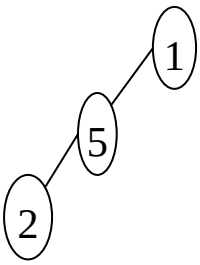


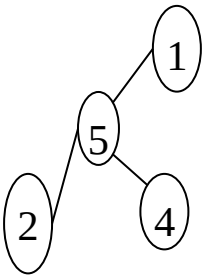
7. Find the minimal spanning tree using Kruskal's algorithm. Show the weights in order and the steps.

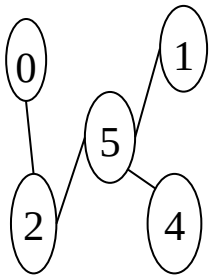


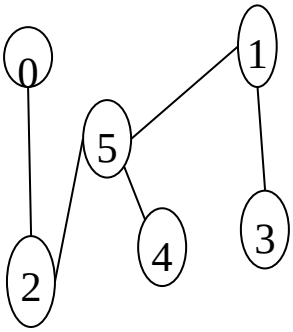
2-5: 1
1-5: 2
0-2: 3
4-5: 3
1-3: 5
3-4: 6
0-1: 7
2-4: 8



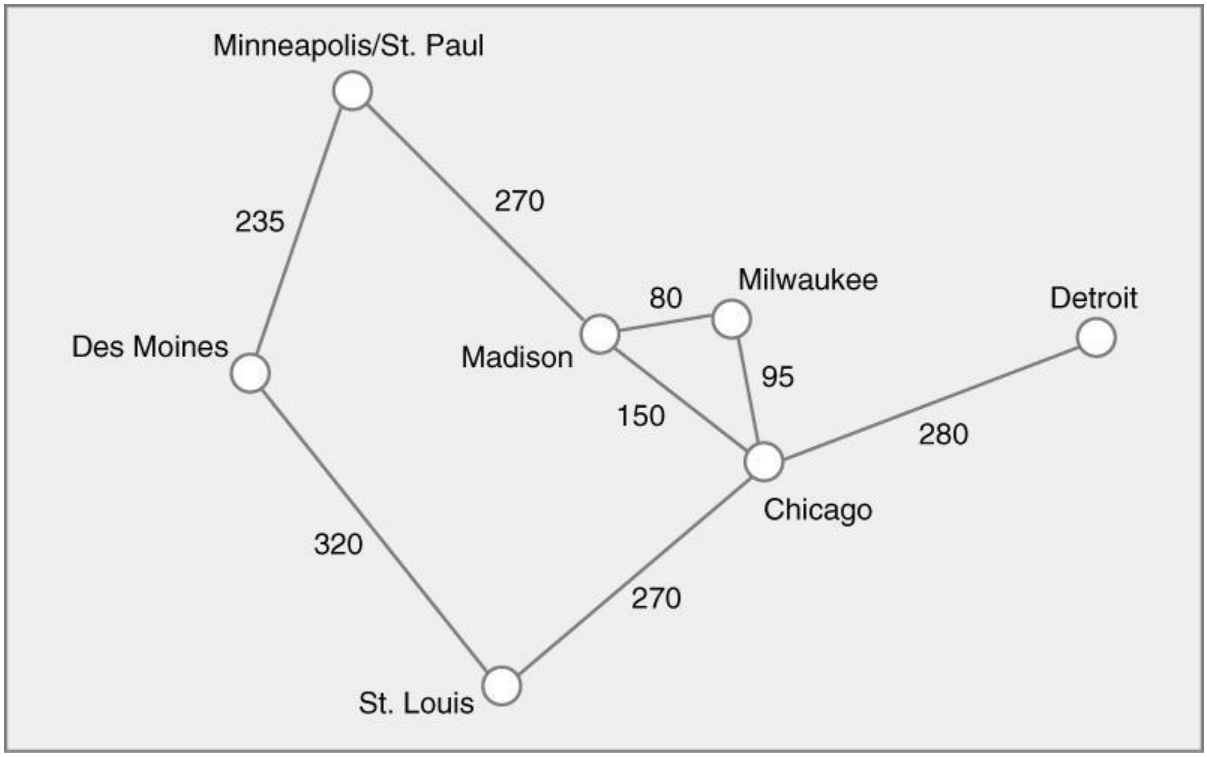




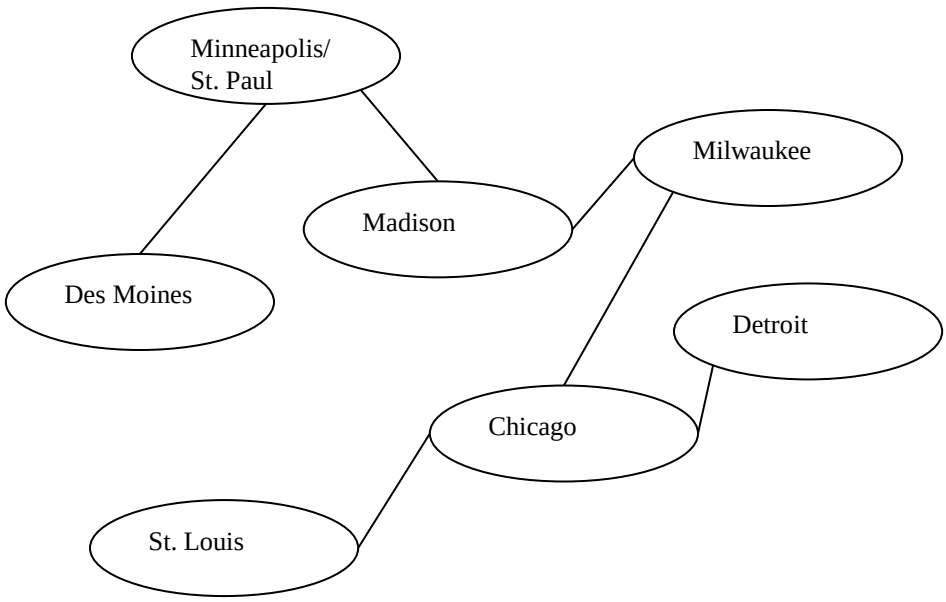




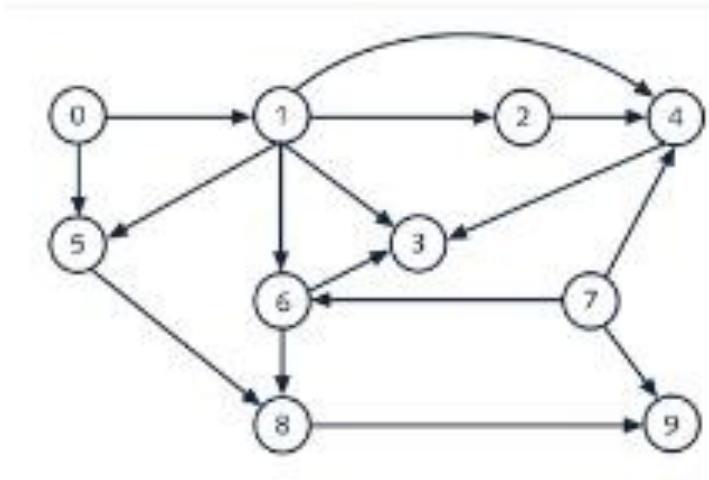
8. Find the minimal spanning tree using the algorithm you prefer. Use Minneapolis/St. Paul as the source vertex



edges	Weights
Mad-Mil	80
Mil-Chi	95
Mad-Chi	150
MI/St Pa – DM	235
MI/St Pa – Mad	270
Chi-SL	270
Chi-Det	280
DM-SL	320



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]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
predCount	0	1	1	3	3	2	2	0	2	2

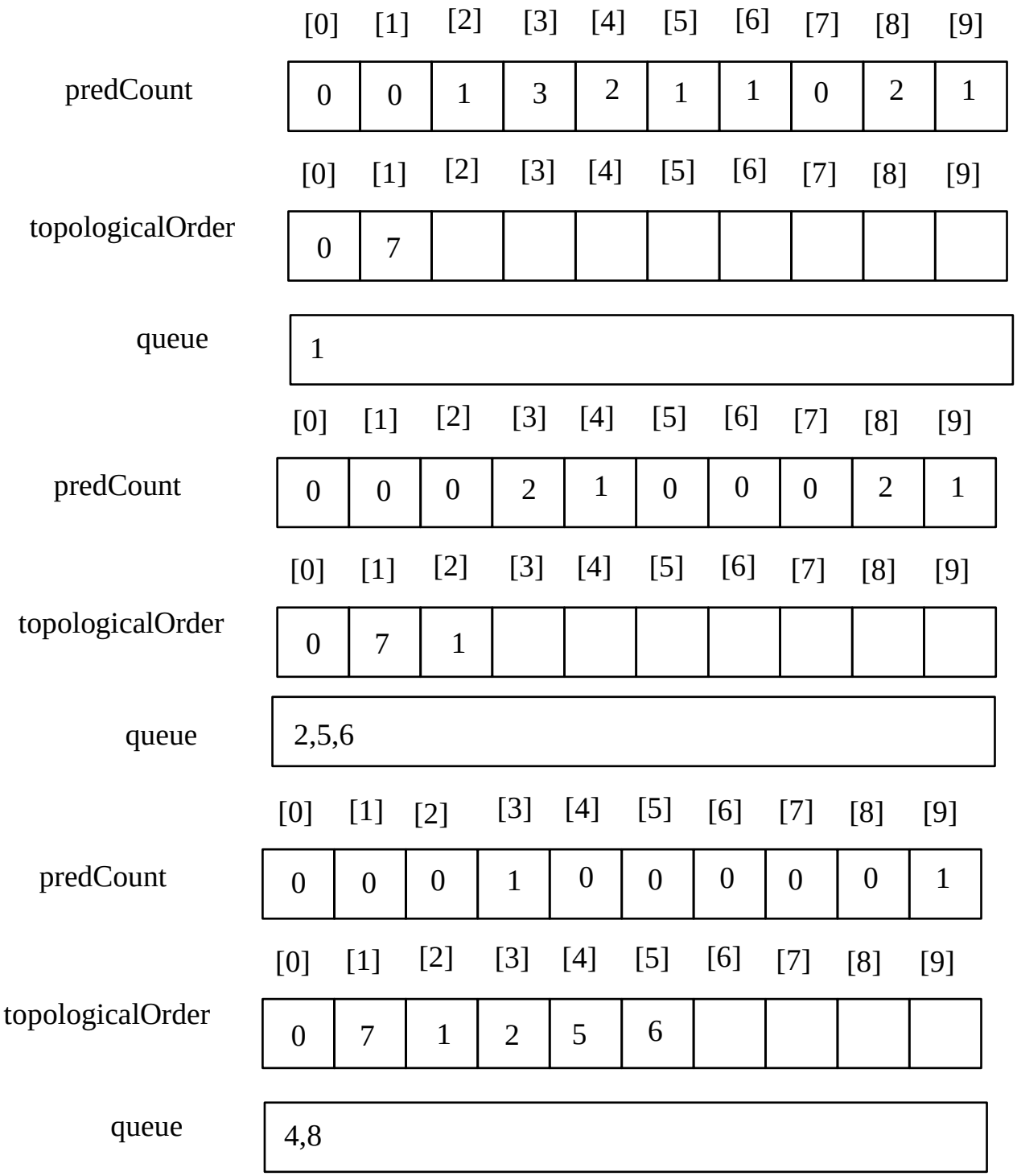
	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
topologicalOrder										

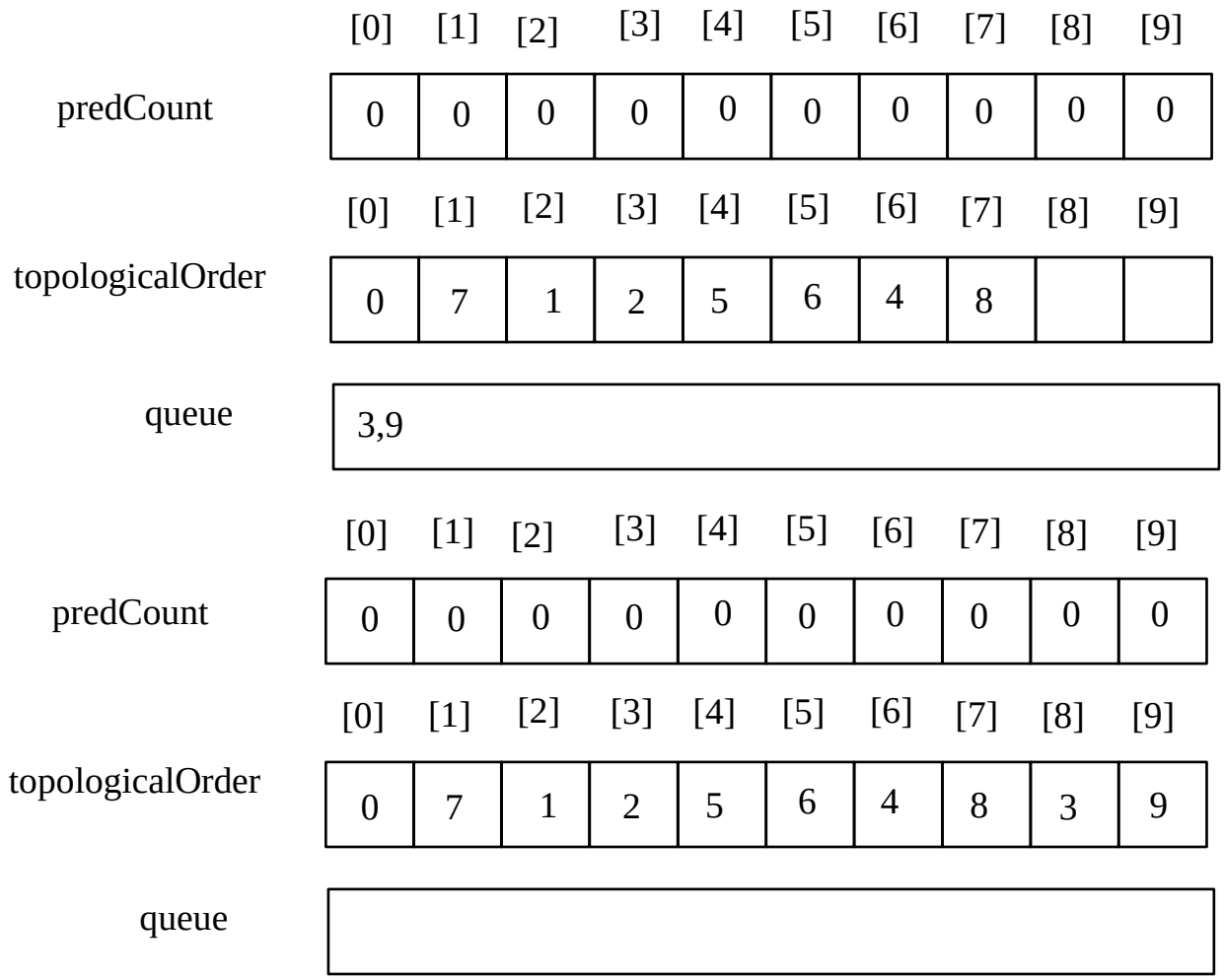
queue: 0, 7

	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
predCount	0	0	1	3	3	1	2	0	2	2

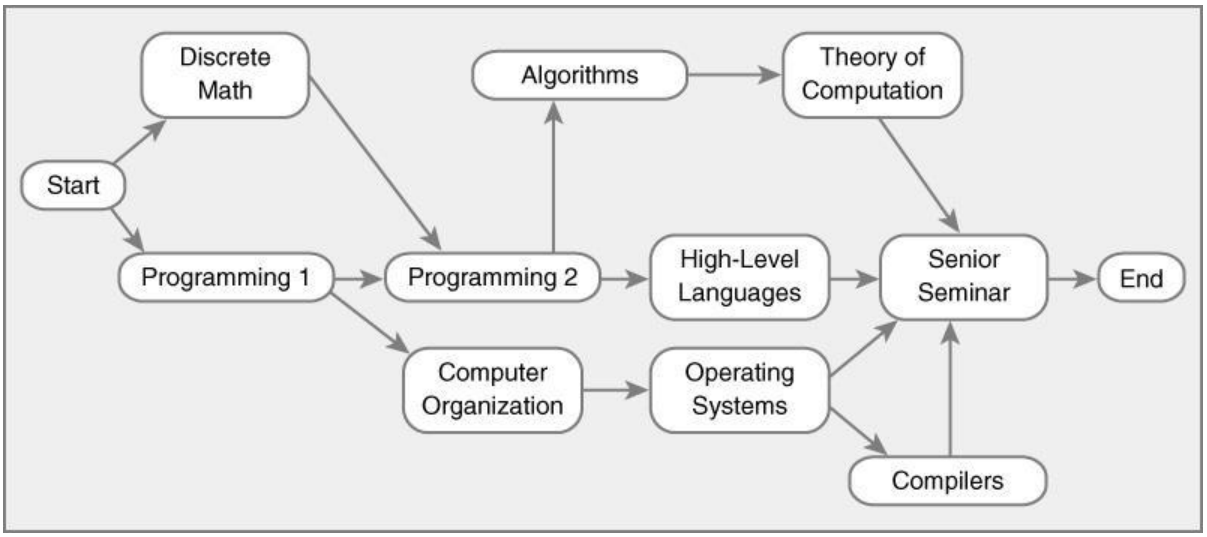
	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
	0									

queue: 7, 1


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


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

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
Compilers
End