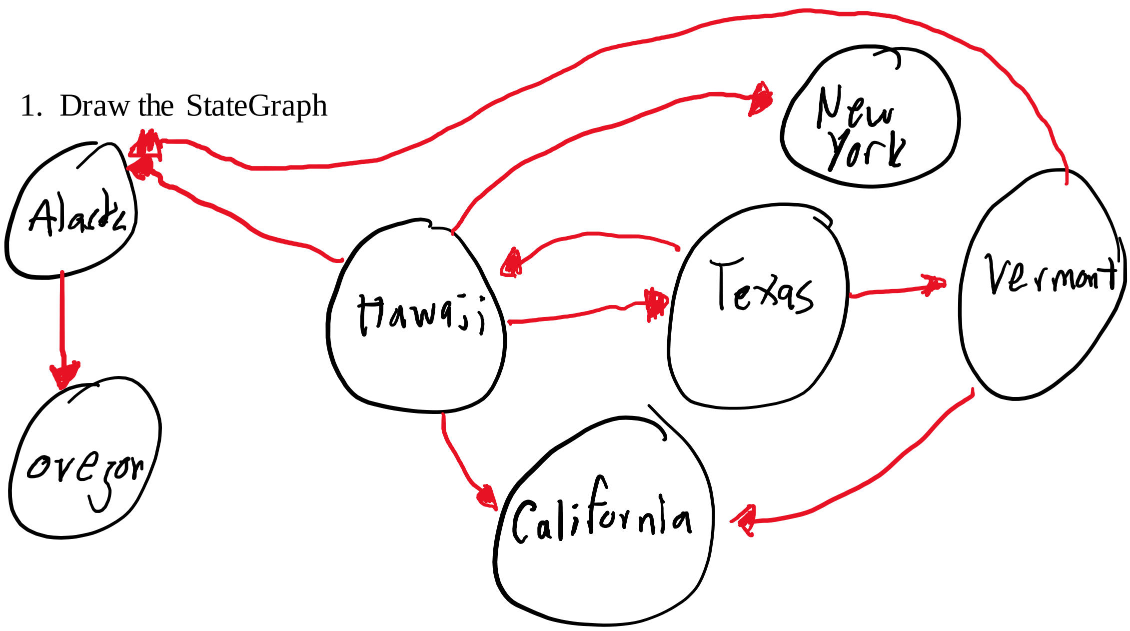
CMSC204
Kartchner

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) = Given

   E(StateGraph) = Given

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		0	1	2	3	4	5	6
Alaska	0	0	0	0	0	1	0	0
California	1	0	0	0	0	0	0	0
Hawaii	2	1	1	0	1	0	1	0
New York	3	0	0	0	0	0	0	0
Oregon	4	0	0	0	0	0	0	0
Texas	5	0	0	1	0	0	0	1
Vermont	6	1	1	0	0	0	0	0

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

Alaska → Oregon

California

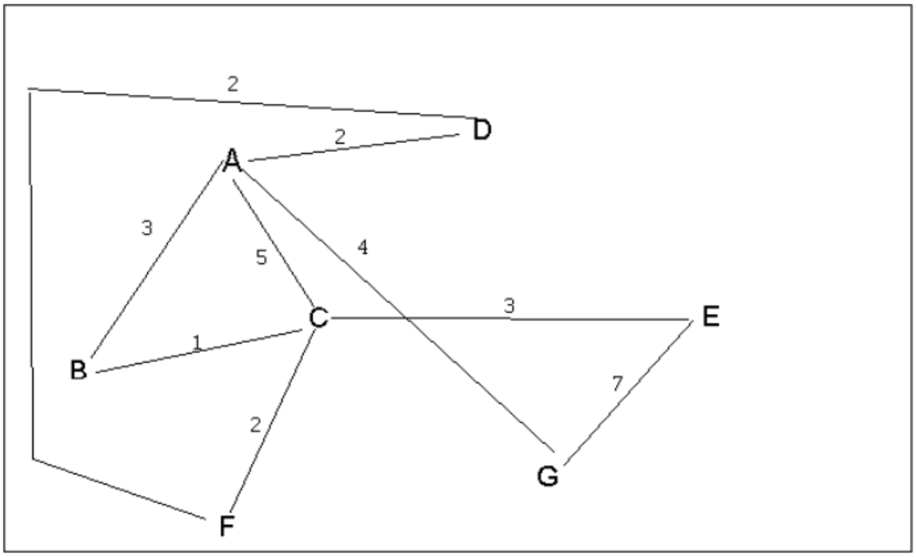
Hawaii → Alaska → California → New York → Texas

New York

Oregon

Texas → Hawaii → Vermont

Vermont → Alaska → California

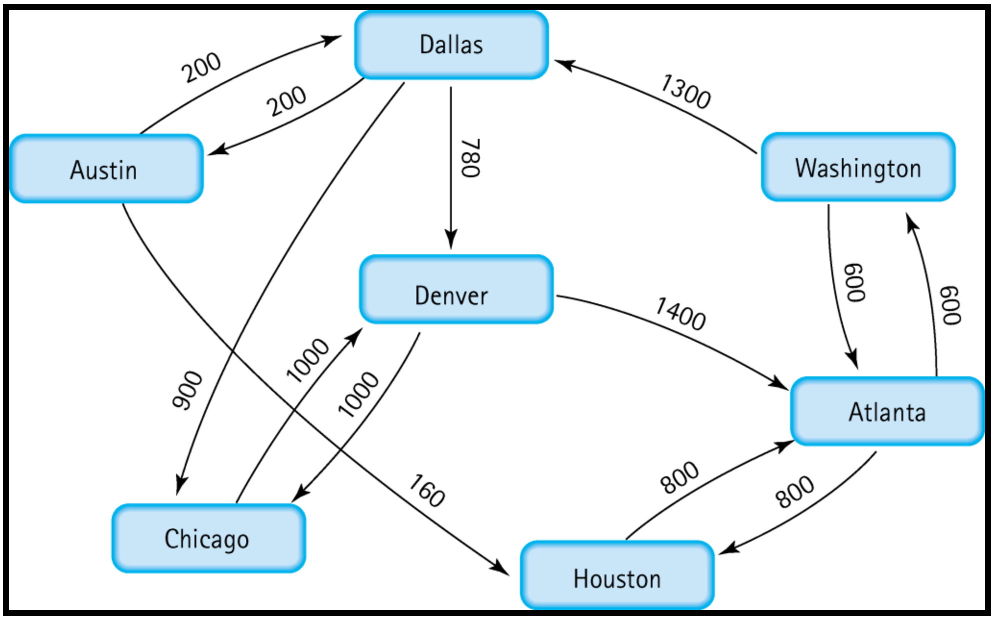


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

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 distance from Atlanta to every other city

Atlanta to Dallas = 1900

Atlanta to Washington = 600

Atlanta to Houston = 800

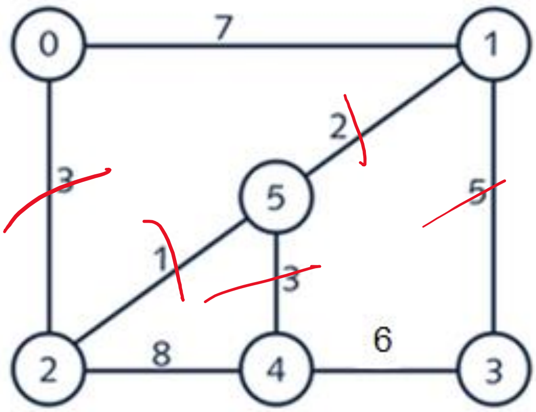
Atlanta to Chicago = 600 +1300 + 900 = 2800

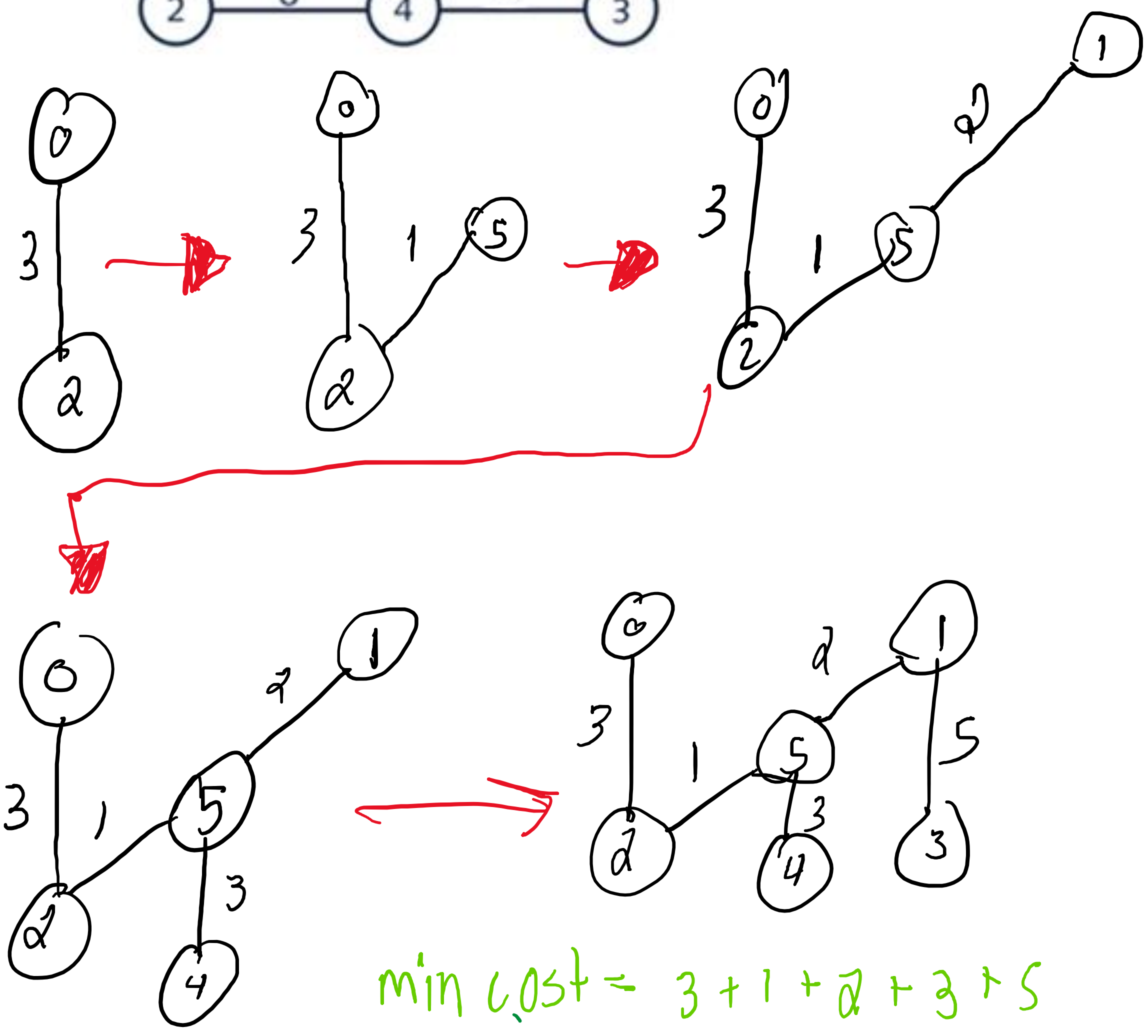
Atlanta to Denver = 2680

Atlanta to Austin = 2100

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

→ = Next step

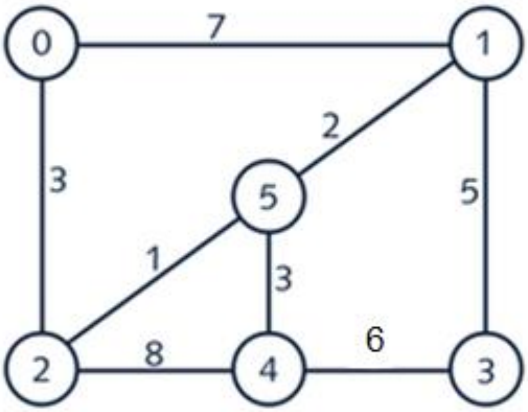




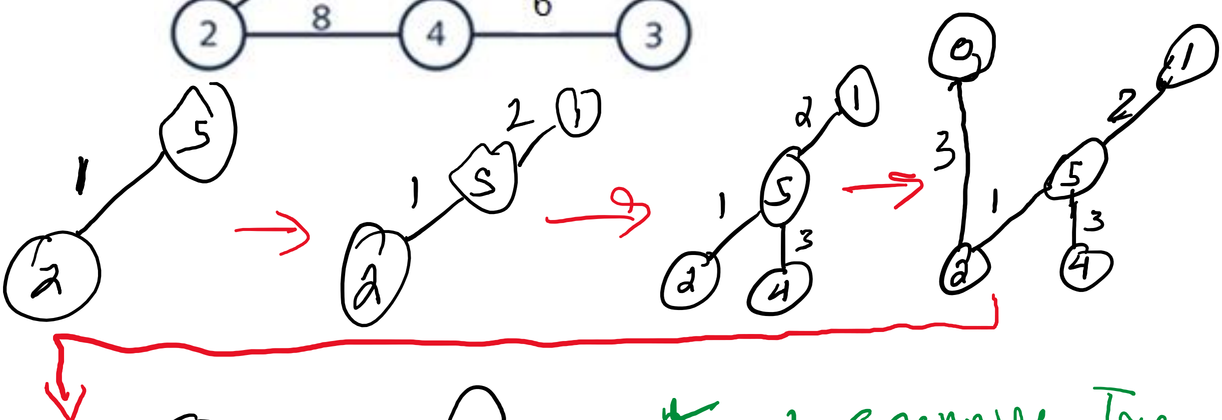
min cost = 3 + 1 + 2 + 3 + 5

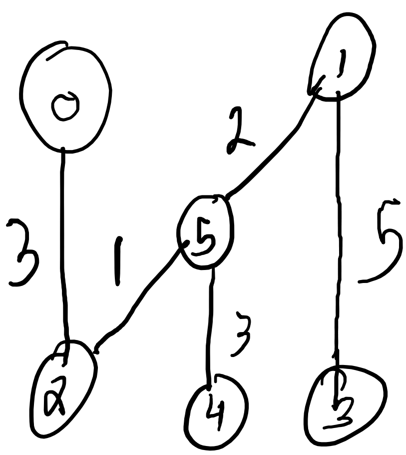
= 14

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



→ = Next step

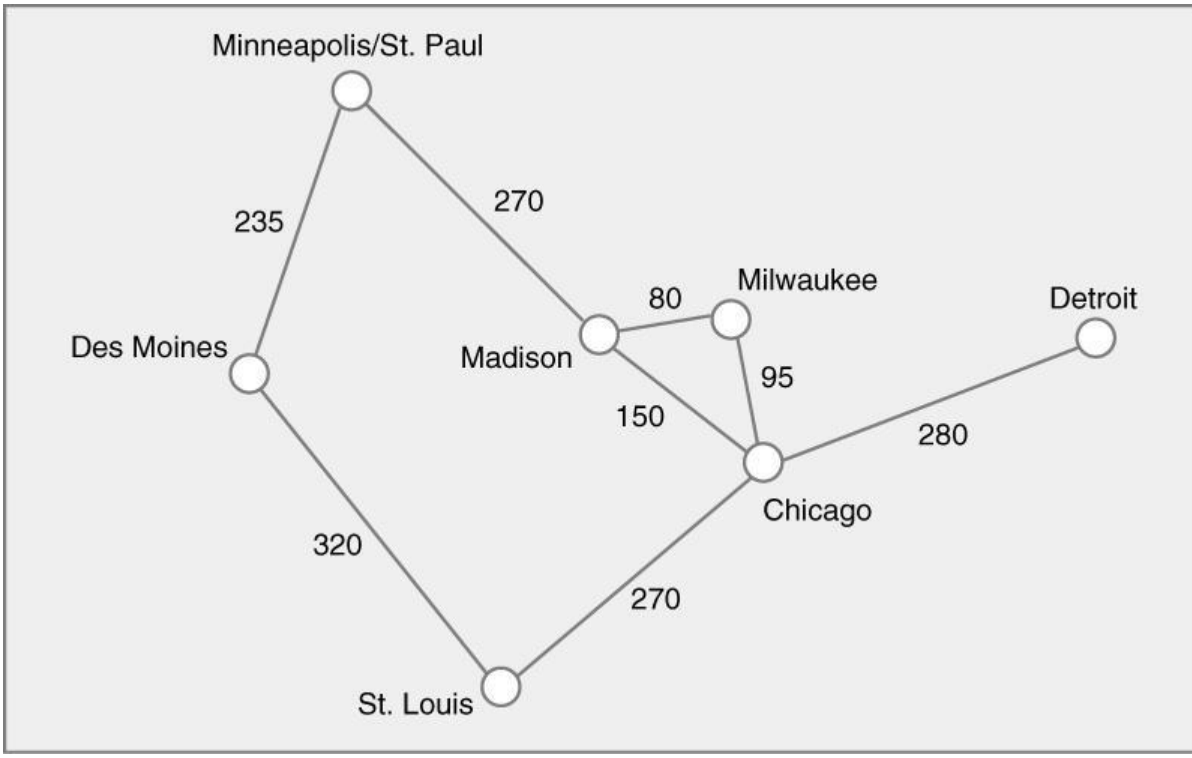




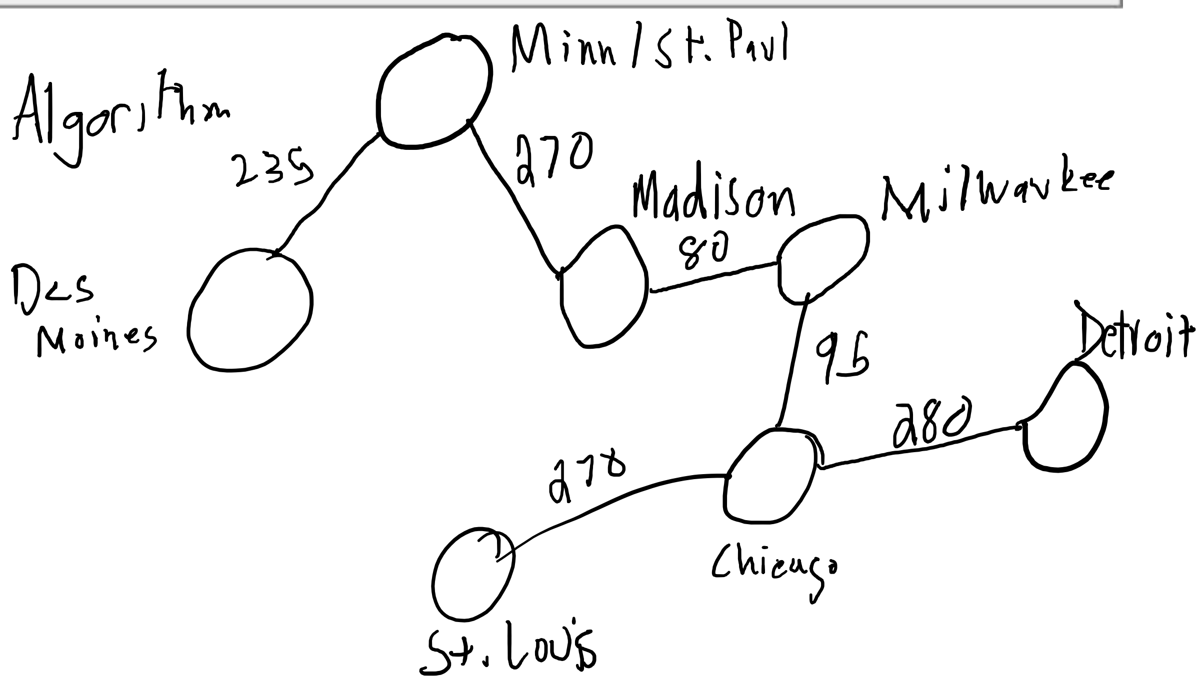
Final spanning Tree

min cost = 14.

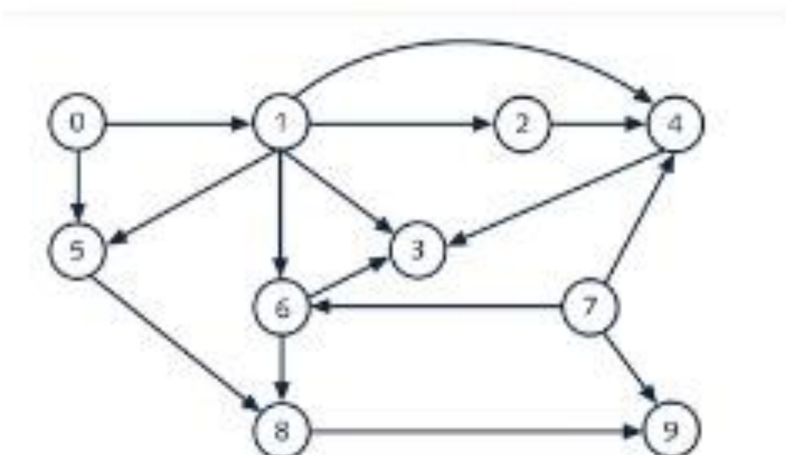
8. Find the minimal spanning tree using the algorithm you prefer. Use Minneapolis/St. Paul as the source vertex



Prims Algorithm



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**
topoOrder										
Queue	**0 7**									

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

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

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

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

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

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

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

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

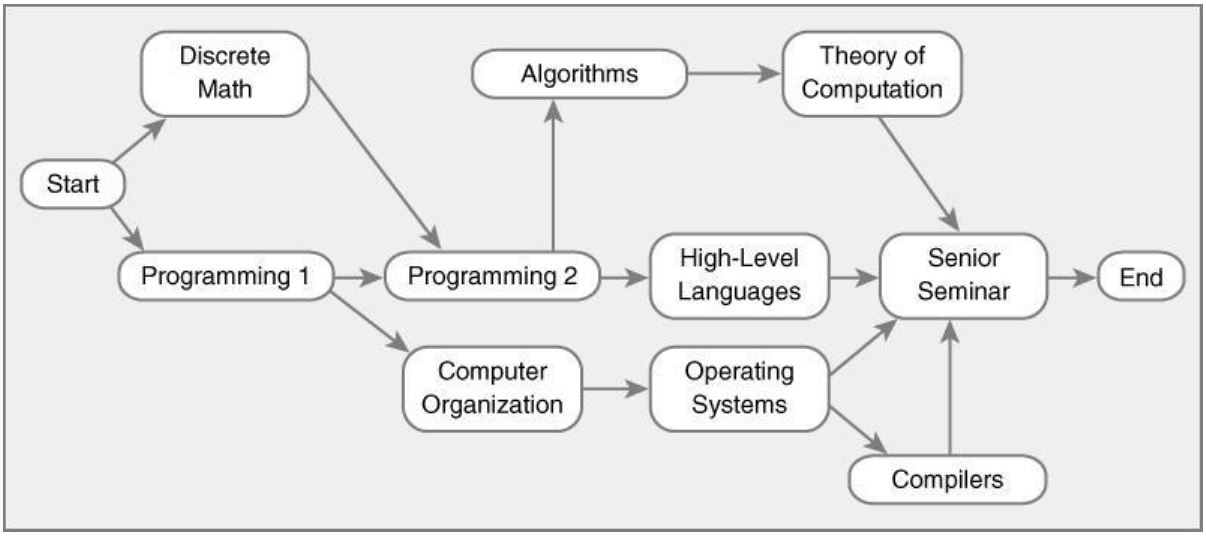
3 **9**

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

3 **9**

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



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