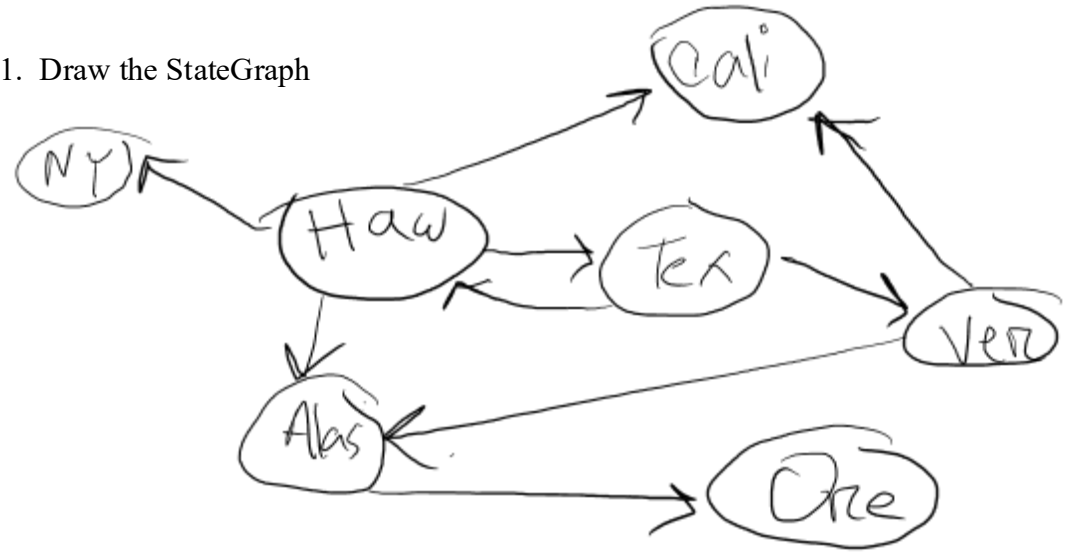
CMSC204
Kartchner

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, New York, California}

E(StateGraph) = {(Alaska, Oregon), (Hawaii,Alaska),(Hawaii,Texas), (Texas, Hawaii), (Hawaii, California), (Hawaii, NewYork), (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? 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

Alaska
California
Hawaii
NewYork
Oregon
Texas
Vermont

	Al	Ca	Ha	NY	Or	Te	Ve
Al	**0**	**0**	**0**	**0**	**1**	**0**	**0**
Ca	0	0	0	0	0	0	0
Ha	1	1	0	1	0	1	0
NY	0	0	0	0	0	0	0
Or	0	0	0	0	0	0	0
Te	0	0	1	0	0	0	1
Ve	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,

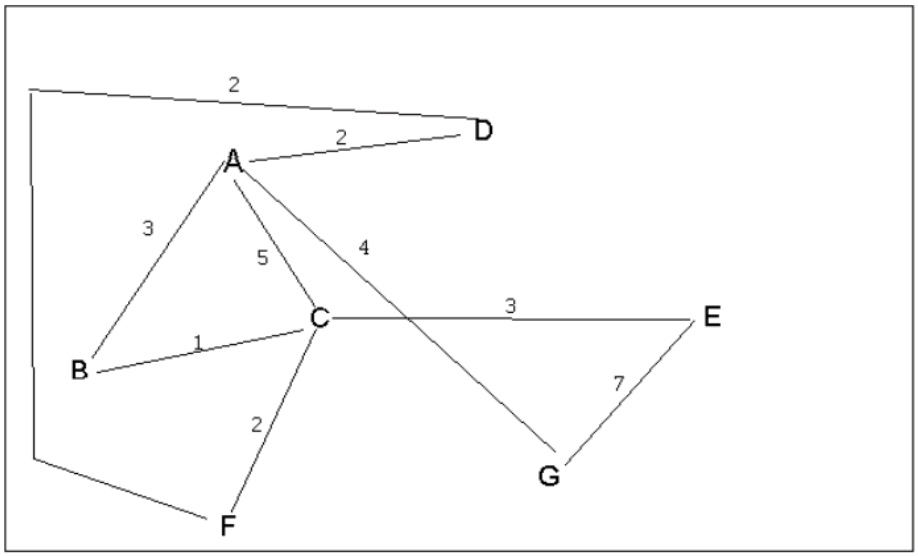
NewYork, Texas]

NewYork: []

Oregon:[]

Texas:[Hawaii, Vermont]

Vermont: [Alaska, California]

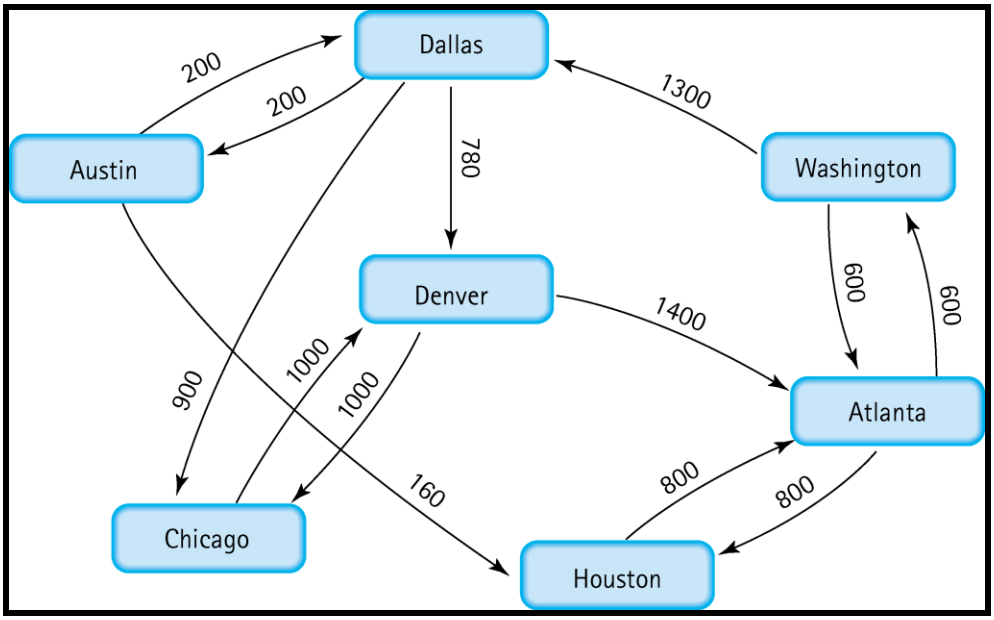


4 a. Which of the following lists the graph nodes in depth first order beginning with E?

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?

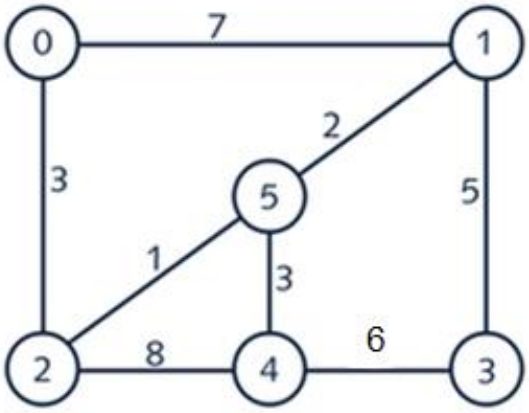
A) F, C, D, A, B, E, G
B) F, D, C, A, B, C, G
C) F, C, D, B, G, A, E
D) a, b, and c are all breadth first traversals



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

Atlanta to Houston= 800
Atlanta to washington =600
Atlanta to Dalla= 600+1300 = 1900
Atlanta to Denver –600+1300+780=2680
Atlanta to Chicago =600+1300+900= 2800
Atlanta to Austin = 600+1300+200= 2100

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

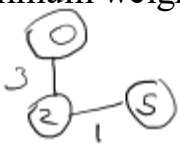


1. Choose a vertex

Ex: 0

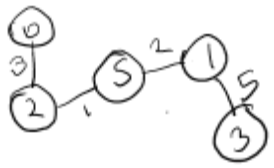
2. find minimum weight
of vertex 0, so (3,7)

3. Find minimum weight of vertex 2, so(1,8)

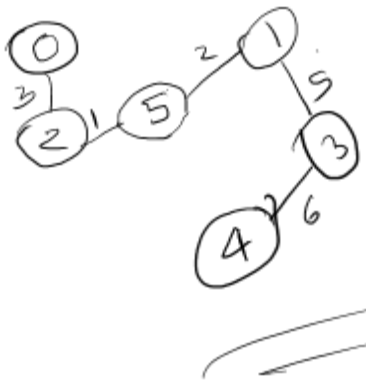


4. Find minimum weight of vertex 5, so(3,2)

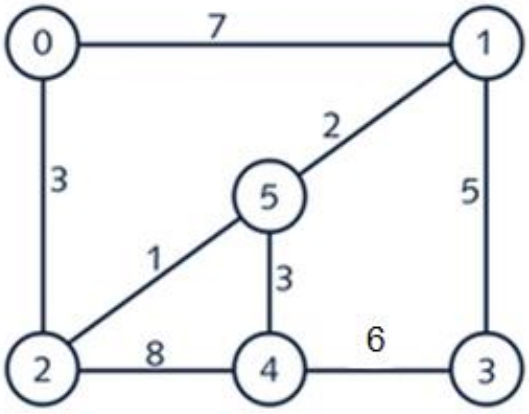
5. Find minimum weight of vertex 1, so (5,7)



6. Find minimum weight of vertex 3, which is (5,6) but 5 is already visited so choose 6



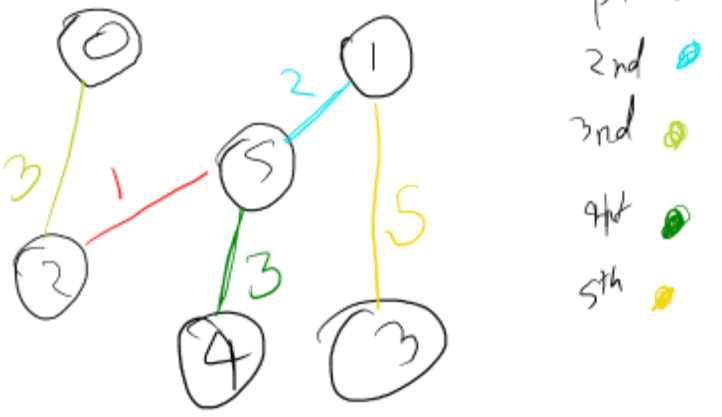
7. Find the minimal spanning tree using Kruskal's algorithm. Show the weights in order and the steps.



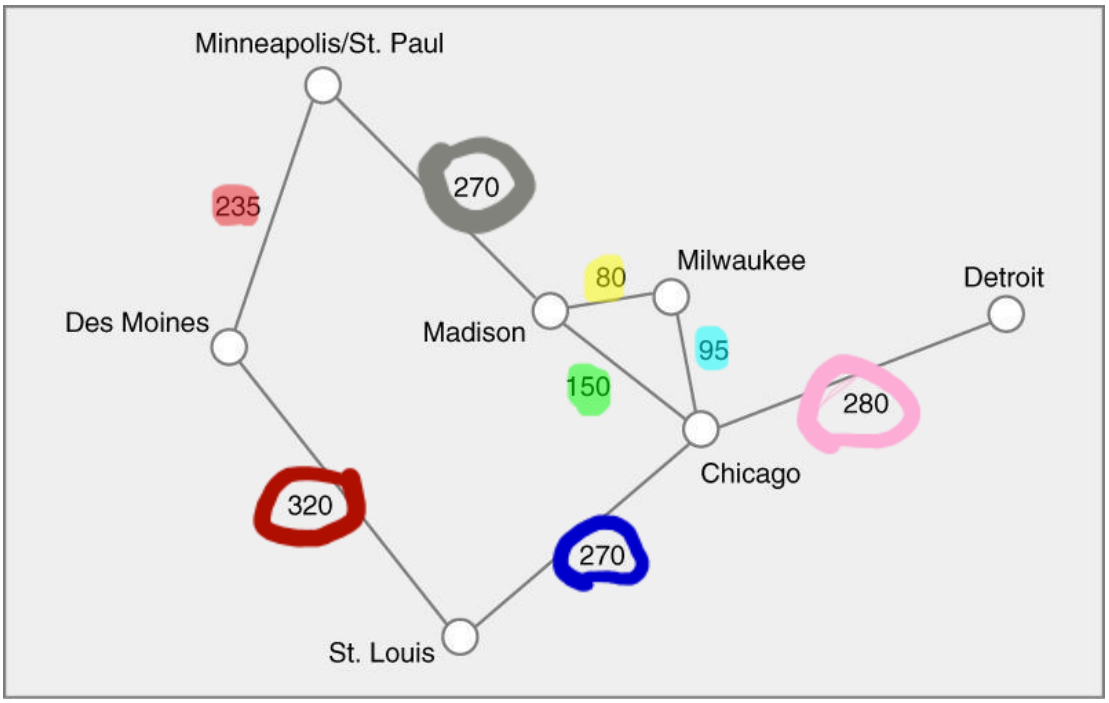
1. Sort the edges from low to high weight

   (1,2,3,3,4,5,6,7,8)

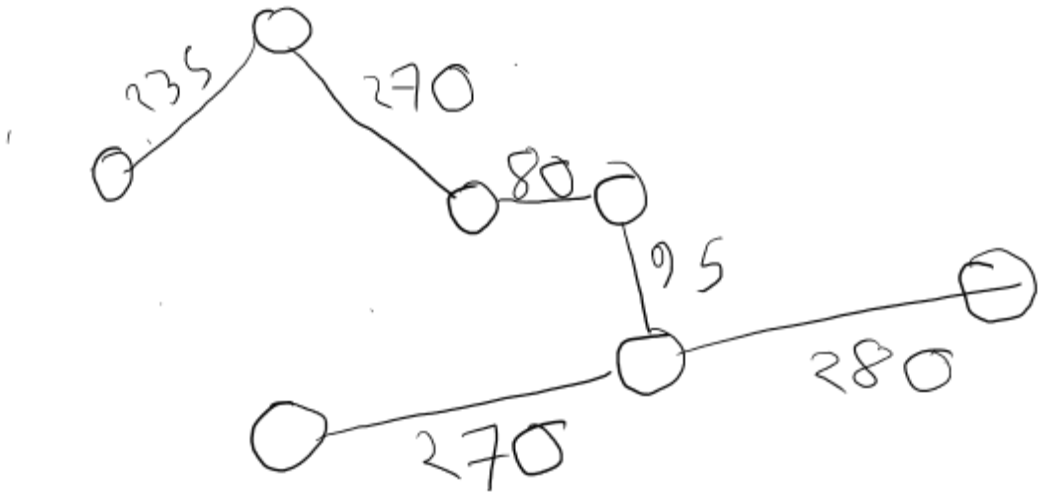
2. Connect the vertex from lowest to highest.



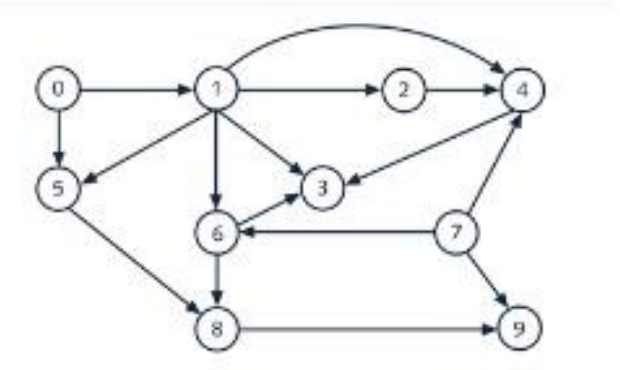
8. Find the minimal spanning tree using the algorithm you prefer. Use Minneapolis/St. Paul as the source vertex



using Kruskal's algorithm



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



1.

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

2. Queue

~~0~~	7

PC = 1

TO = 0

3.

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

Q: ~~X~~ ~~X~~

0	7	1

PC = | 1 | 2 |

TO = | 0 | 7 |

4.

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

Q:

0	7	1

PC:

0	1	2

TO:

0	7	1

5.

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

Q:

0	7	1	5	6

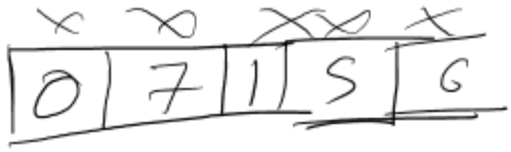
PC:

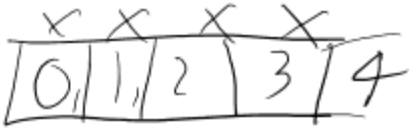
0	1	2	3

TO:

0	7	1	5

delete 6 and add to TO

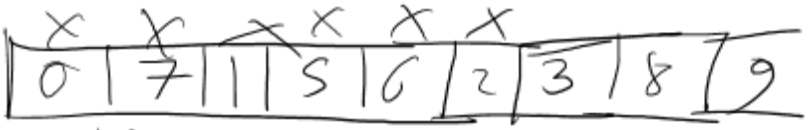
Q: 

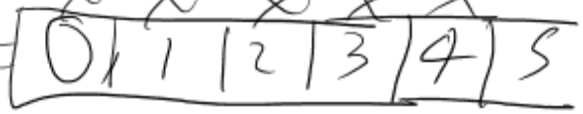
PC: 

TO: 

6.

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

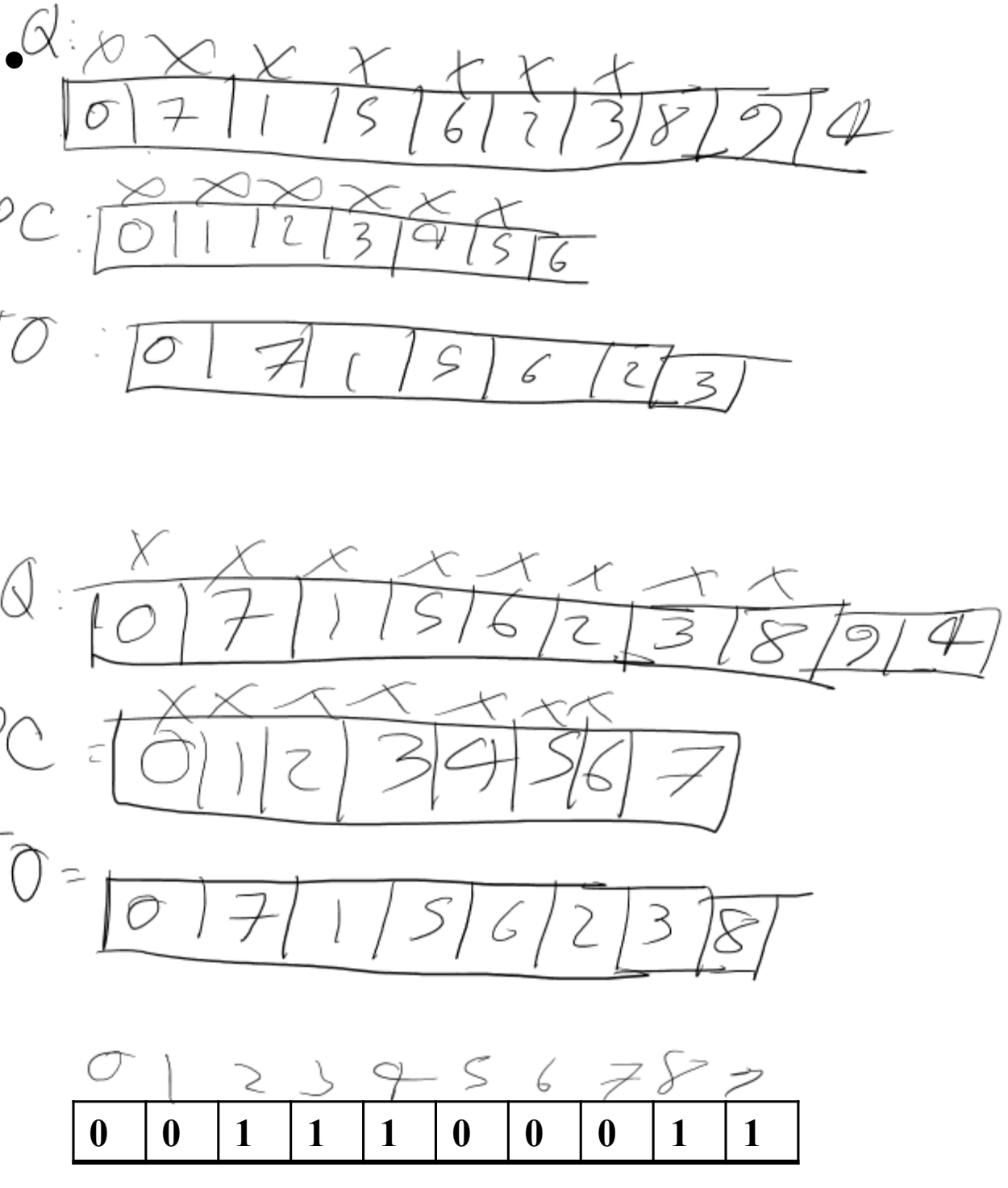
Q: 

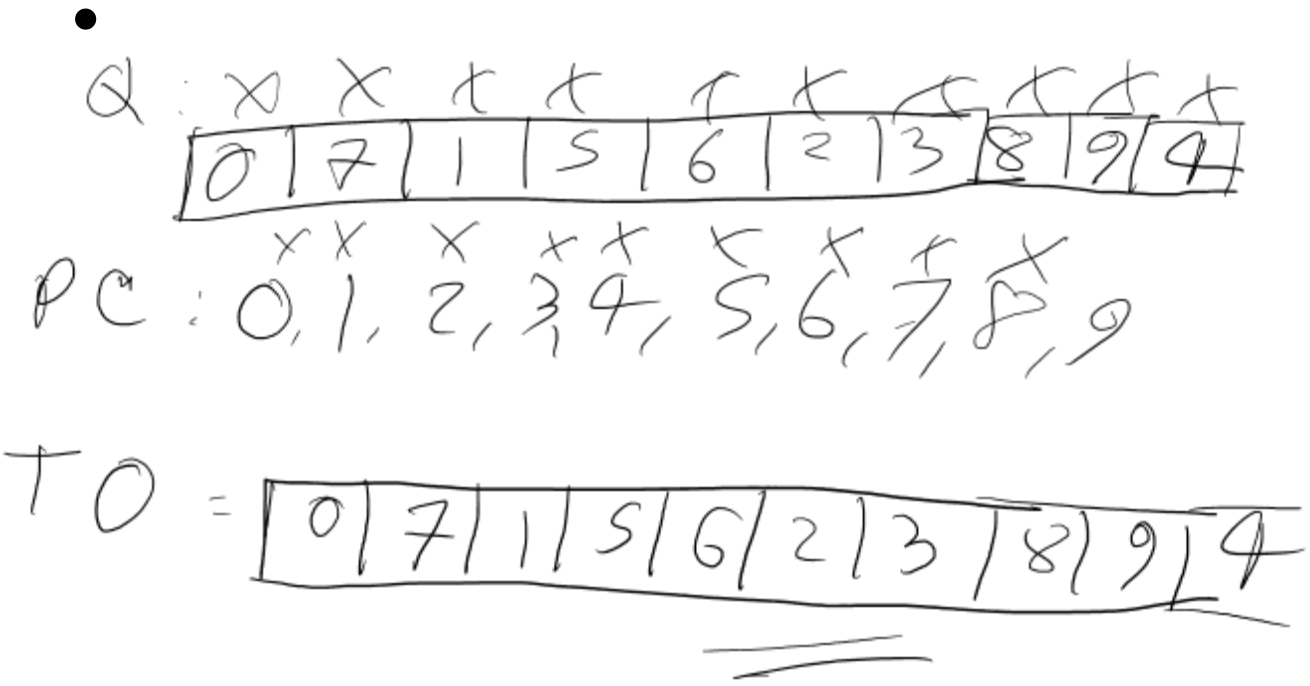
PC = 

TO = 

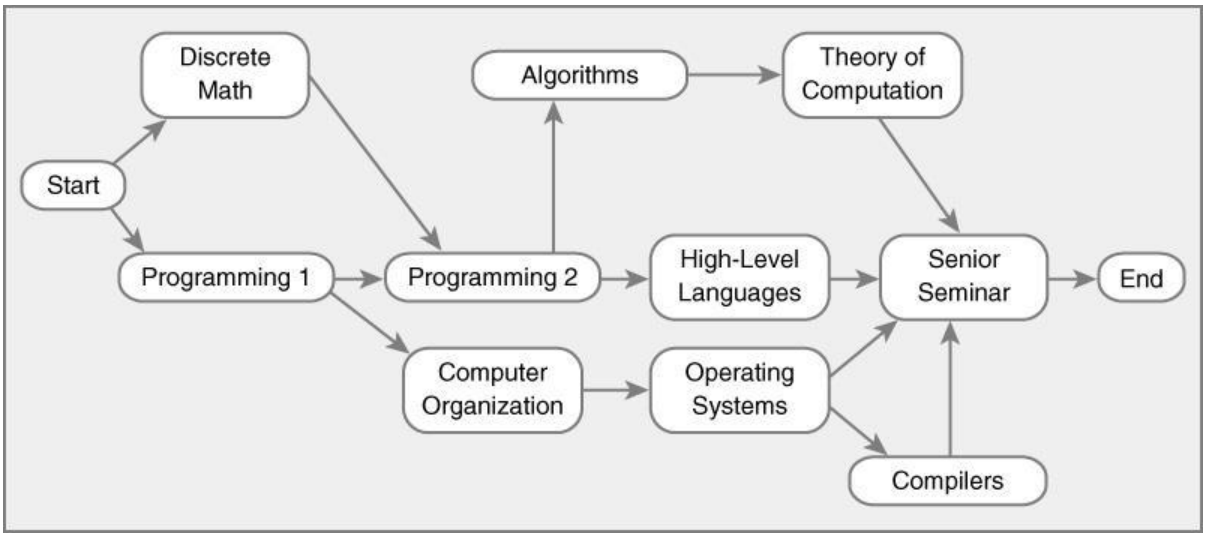
7.

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


Q:
PC:
TO:
8.
Q:
PC =
TO =
9.
0 1 2 3 4 5 6 7 8 9
0 0 1 1 1 0 0 0 1 1


Q :
0 7 1 5 6 2 3 8 9 4
PC : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
TO = 0 7 1 5 6 2 3 8 9 4

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



[Start, Discrete Math, Programming 1,Programming 2, Computer Organization, Algorithms, HighLevel Language, Operating Systems, Theory Computation, Senion Seminar, Compilers, End]