GTU Department of Computer Engineering

CSE 222/505 - Spring 2020

Homework 8 - Q1

Report

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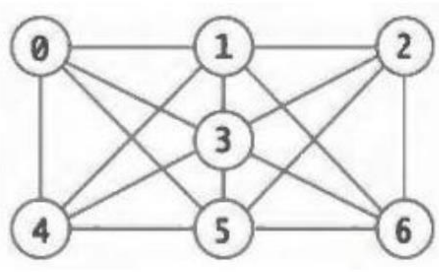
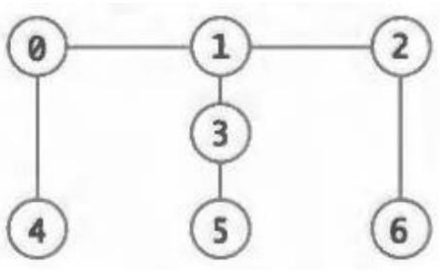


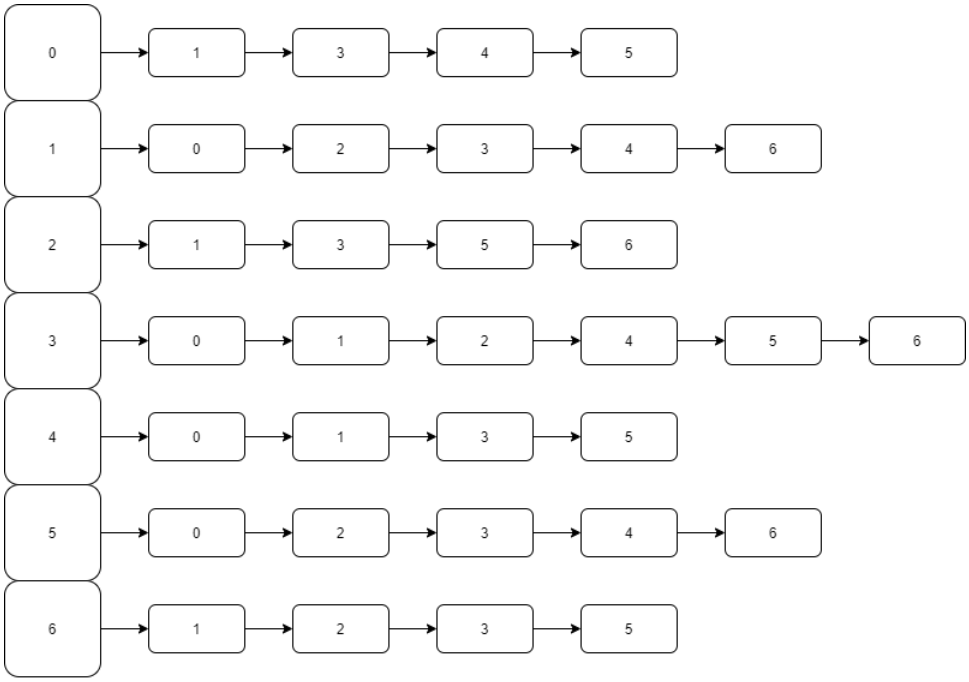
graph-1



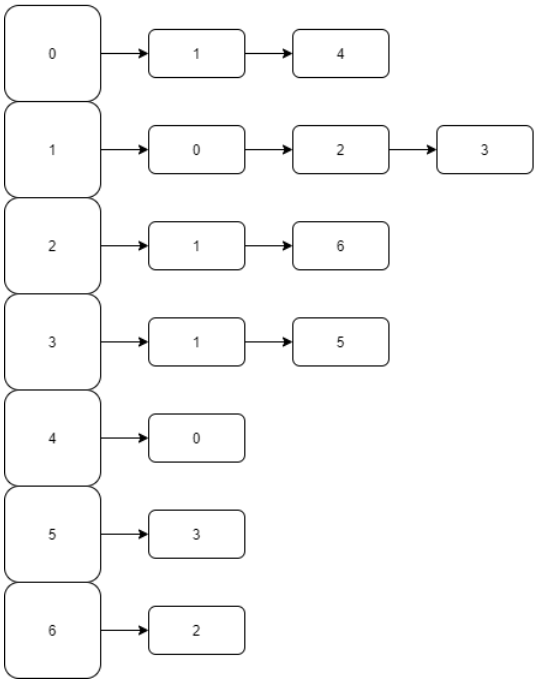
graph-2

- Represent the graphs above using adjacency lists. Draw the corresponding data structure.

graph-1 adjacency lists representation :



graph-2 adjacency lists representation :



- Represent the graphs above using an adjacency matrix. Draw the corresponding data structure.

graph-1 adjacency matrix representation :

	0	1	2	3	4	5	6
0	0	1	0	1	1	1	0
1	1	0	1	1	1	0	1
2	0	1	0	1	0	1	1
3	1	1	1	0	1	1	1
4	1	1	0	1	0	1	0
5	1	0	1	1	1	0	1
6	0	1	1	1	0	1	0

graph-2 adjacency matrix representation :

	0	1	2	3	4	5	6
0	0	1	0	0	1	0	0
1	1	0	1	1	0	0	0
2	0	1	0	0	0	0	1
3	0	1	0	0	0	1	0
4	1	0	0	0	0	0	0
5	0	0	0	1	0	0	0
6	0	0	1	0	0	0	0

- For each graph above, what are the IVI=n, the IEI=m, and the density? Which representation is better for each graph?

Density = (the number of edge) / (the number of possible edges)

Density = $|E| / |V|^2$

graph-1 :

$|E| = 32$

$|V| = 6$

Dense graph, matrix represetation is better.

graph-2 :

$|E| = 11$

$|V| = 6$

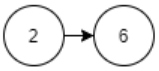
Sparse graph, list representation is better.

- Draw DFS tree starting from vertex 2 and traversing the vertices adjacent to a vertex in descending order (largest to smallest).

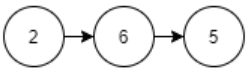
graph-1 (DFS):

Discovery (visit) order = 2
Finish order =

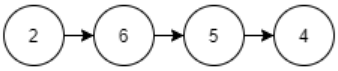
Discovery (visit) order = 2, 6
Finish order =



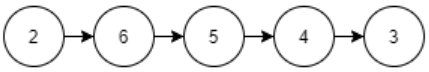
Discovery (visit) order = 2, 6, 5
Finish order =



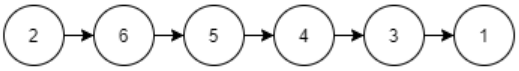
Discovery (visit) order = 2, 6, 5, 4
Finish order =



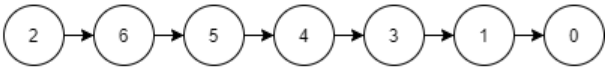
Discovery (visit) order = 2, 6, 5, 4, 3
Finish order =



Discovery (visit) order = 2, 6, 5, 4, 3, 1
Finish order =



Discovery (visit) order = 2, 6, 5, 4, 3, 1, 0
Finish order =

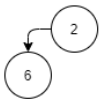


Discovery (visit) order = 2, 6, 5, 4, 3, 1, 0
Finish order = 0, 1, 3, 4, 5, 6, 2

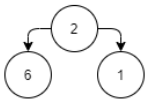
graph-2 (DFS):

Discovery (visit) order = 2
Finish order =

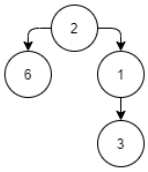
Discovery (visit) order = 2, 6
Finish order =



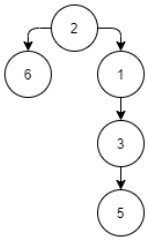
Discovery (visit) order = 2, 6, 1
Finish order = 6



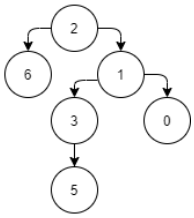
Discovery (visit) order = 2, 6, 1, 3
Finish order = 6



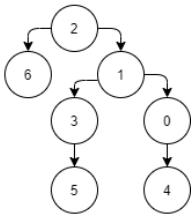
Discovery (visit) order = 2, 6, 1, 3, 5
Finish order = 6



Discovery (visit) order = 2, 6, 1, 3, 5, 0
Finish order = 6, 5, 3



Discovery (visit) order = 2, 6, 1, 3, 5, 0, 4
Finish order = 6, 5, 3

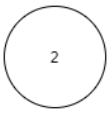


Discovery (visit) order = 2, 6, 1, 3, 5, 0, 4
Finish order = 6, 5, 3, 4, 0, 1, 2

- Draw BFS tree starting from vertex 2 and traversing the vertices adjacent to a vertex in descending order (largest to smallest).

graph-1 (BFS):

Queue = 2
visit sequence =



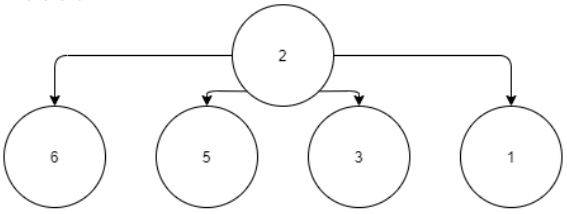
Queue = 6, 5, 3, 1
visit sequence = 2

Queue = 5, 3, 1
visit sequence = 2, 6

Queue = 3, 1, 4, 0
visit sequence = 2, 6, 5

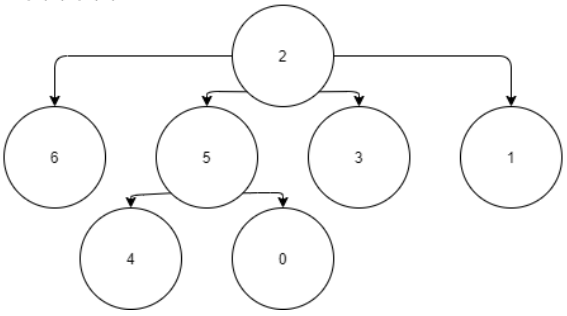
Queue = 1, 4, 0
visit sequence = 2, 6, 5, 3

Queue = 4, 0
visit sequence = 2, 6, 5, 3, 1



Queue = 0
visit sequence = 2, 6, 5, 3, 1, 4

Queue =
visit sequence = 2, 6, 5, 3, 1, 4, 0



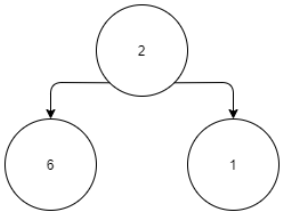
graph-2 (BFS):

Queue = 2
visit sequence =

Queue = 6, 1
visit sequence = 2

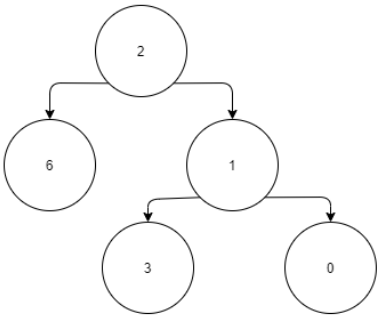
Queue = 1
visit sequence = 2, 6

Queue = 3, 0
visit sequence = 2, 6, 1



Queue = 0, 5
visit sequence = 2, 6, 1, 3

Queue = 5, 4
visit sequence = 2, 6, 1, 3, 0



Queue = 4
visit sequence = 2, 6, 1, 3, 0, 5

Queue =
visit sequence = 2, 6, 1, 3, 0, 5, 4