CMPT 280

Topic 20: Graph Data Structures

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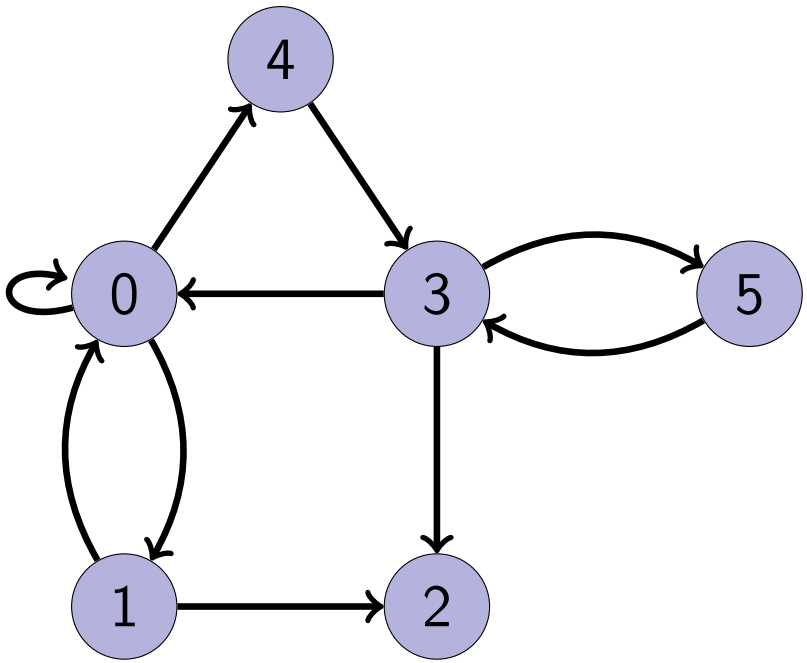
References

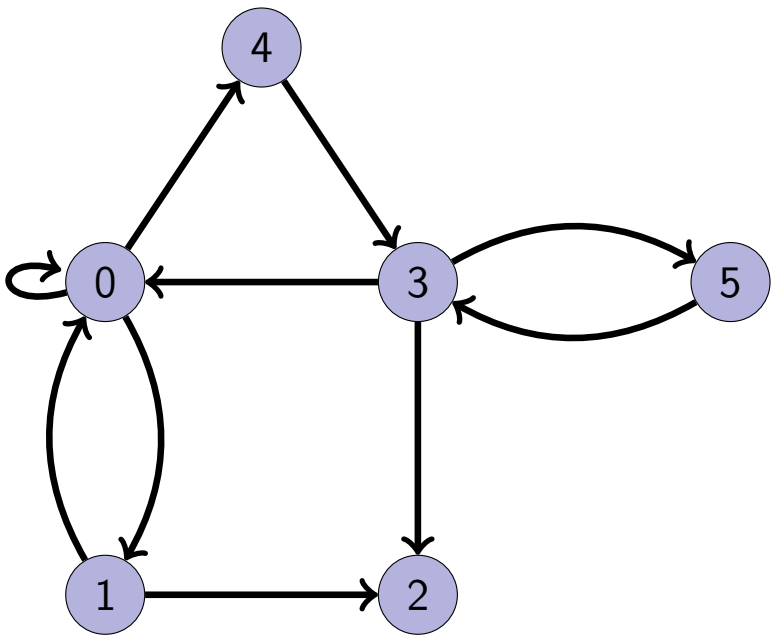
- Textbook, Chapter 20

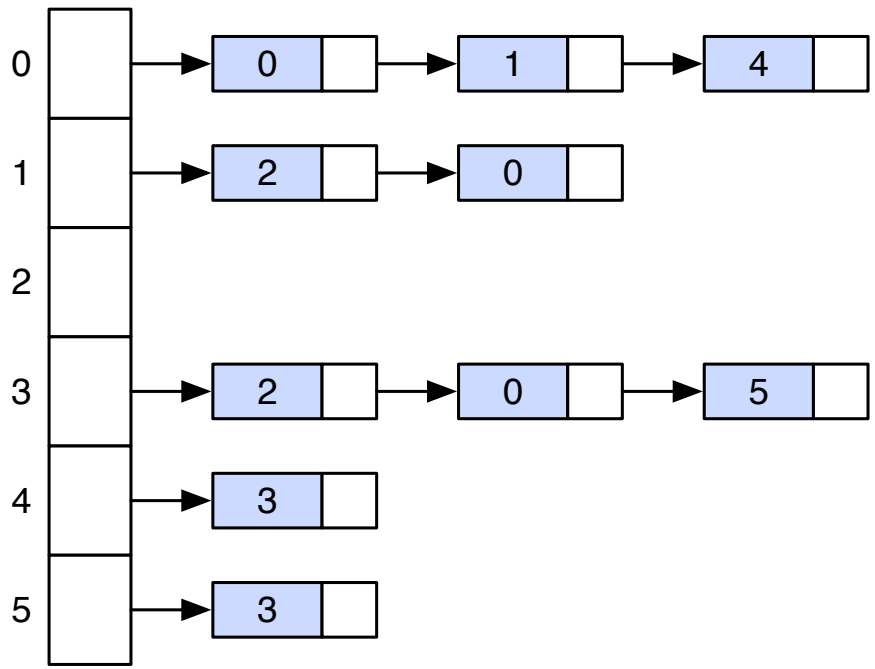
Adjacency Matrix



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

Adjacency List





Graph Representation Tradeoffs

Representation	Sequential Edge Access	Random Edge Access
Adjacency Matrix	$\Theta(n)$	$\Theta(1)$
Adjacency List	$\Theta(outdegree(i))$	$O(outdegree(i))$

Representation	Space
Adjacency Matrix	$\Theta(n^2)$
Adjacency List	$\Theta(n+m)$

$n = |V|$ (number of nodes), $m = |E|$ (number of edges)

Exercise 1

Adjacency Matrix

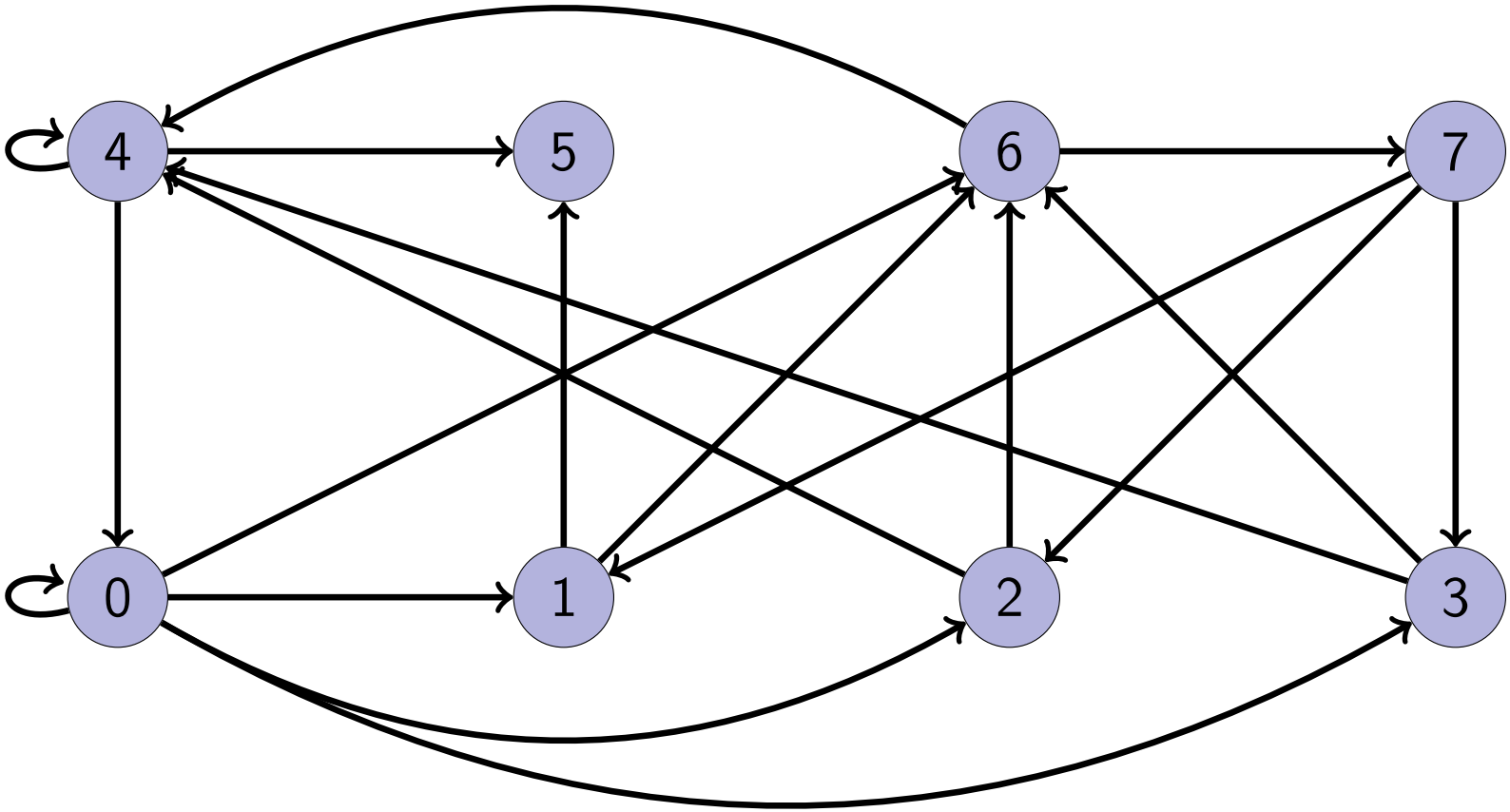
	0	1	2	3	4	5	6
0	0	0	0	0	1	0	1
1	1	1	0	1	0	1	0
2	0	0	0	0	0	0	0
3	0	1	0	1	1	0	0
4	1	0	1	0	0	1	1
5	1	1	1	1	0	0	0
6	0	0	1	1	0	1	0

a) Is the represented graph undirected? How do you know?

b) Draw the nodes and edges of this graph.

Exercise 2

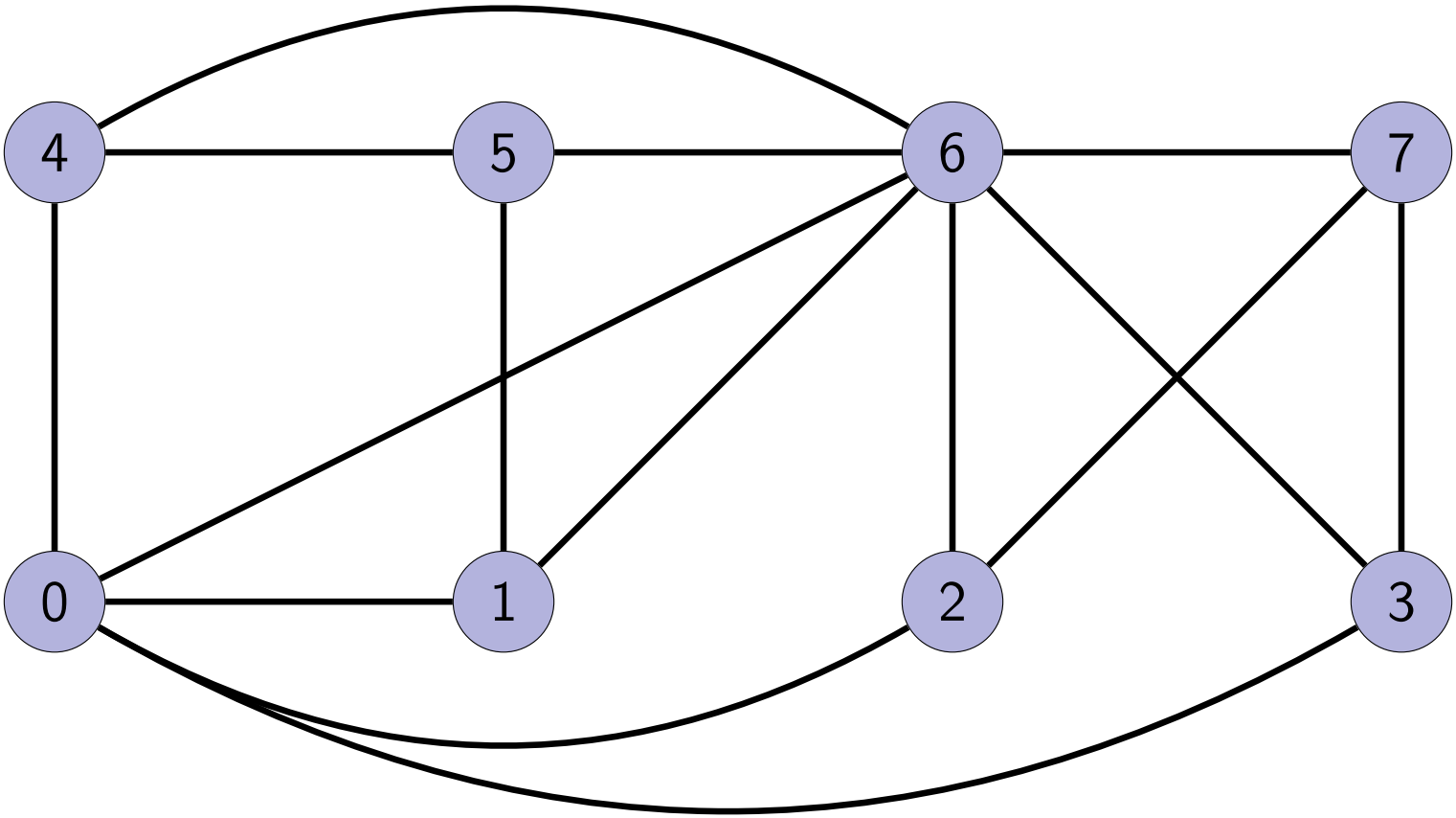
Adjacency Matrix



Give the adjacency matrix representation for this graph.

Exercise 3

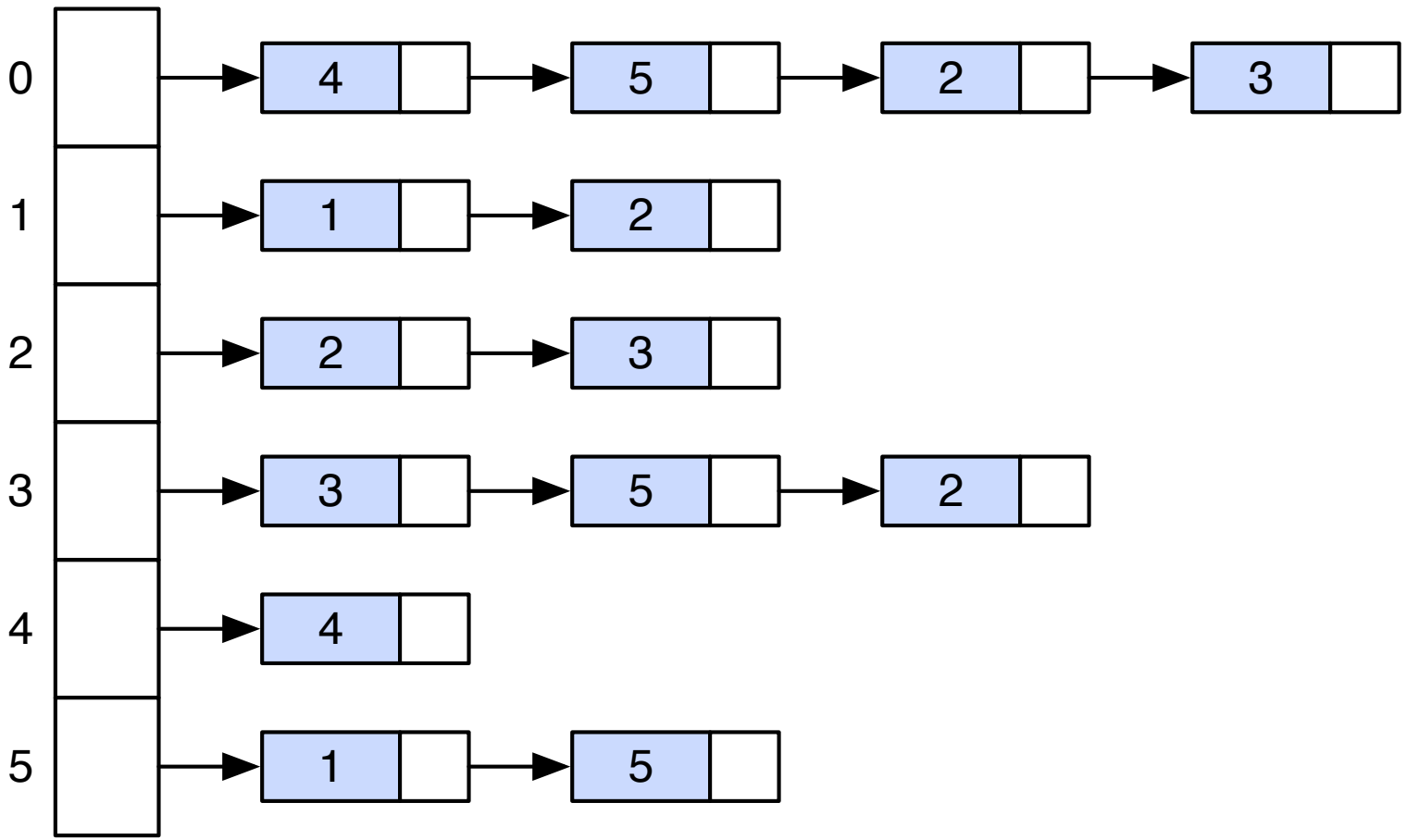
Adjacency Matrix



Give the adjacency matrix representation for this graph.

Exercise 4

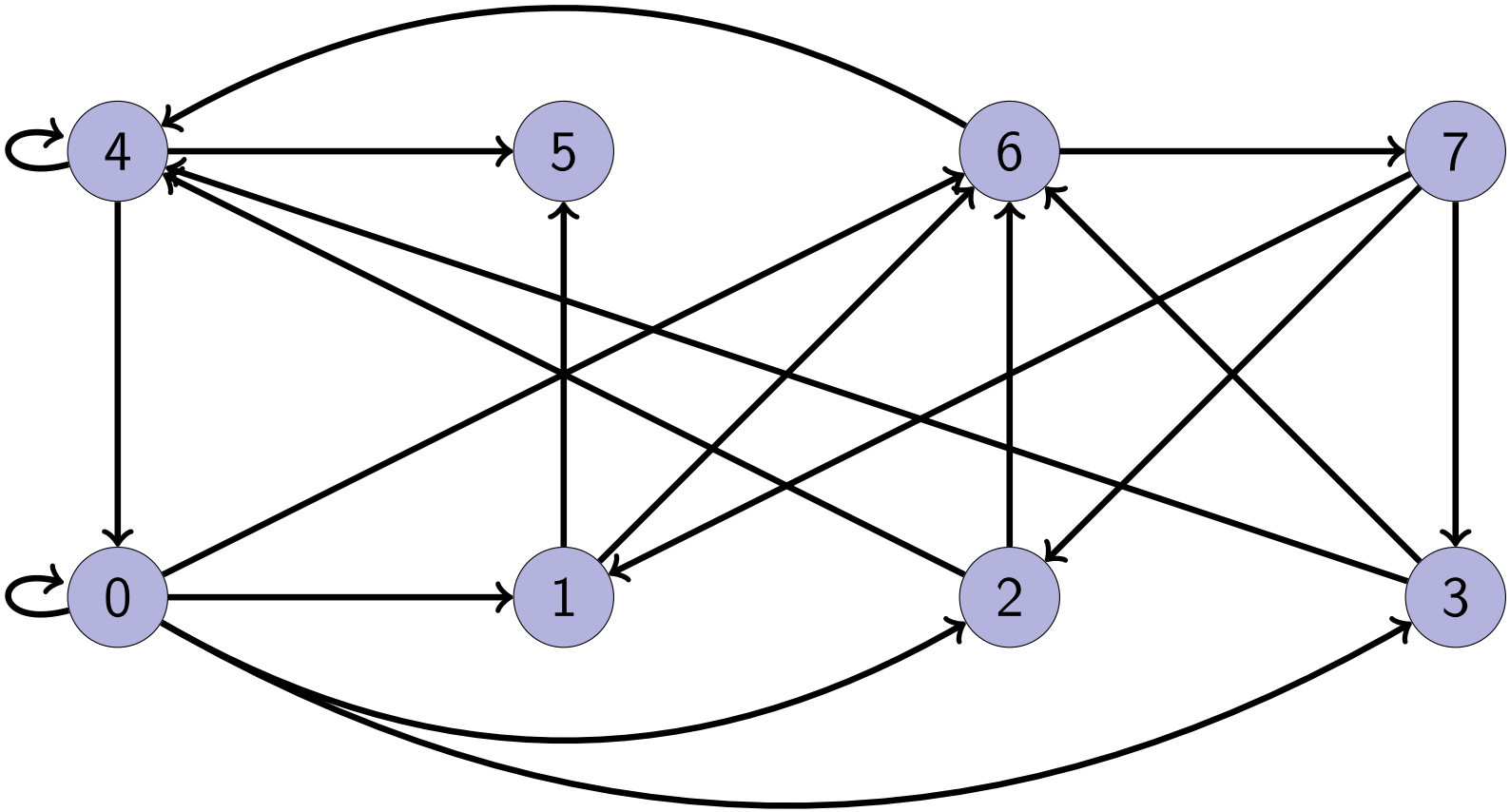
Adjacency List



Draw the graph represented by this adjacency list.

Exercise 5

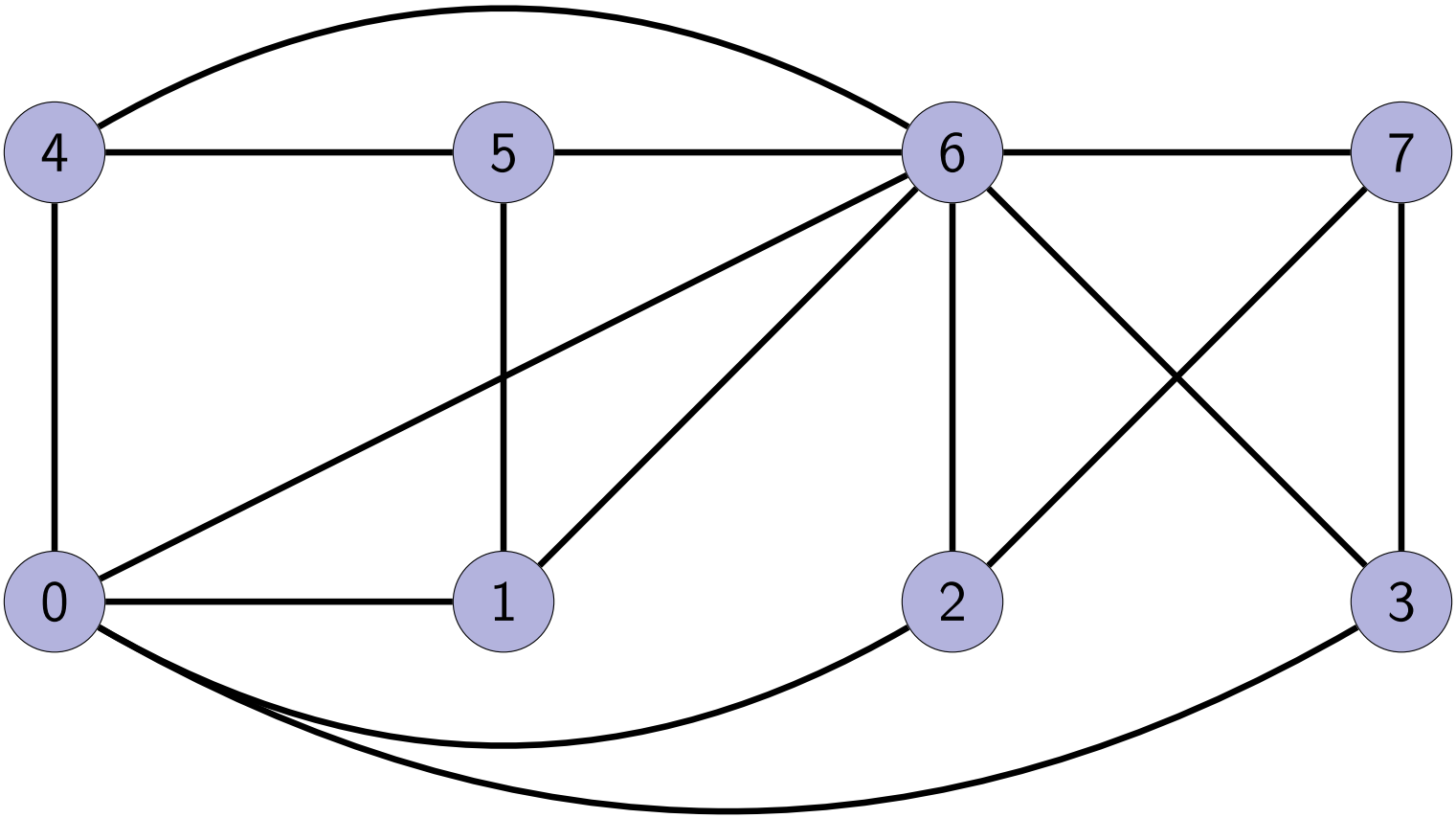
Adjacency List



Give the adjacency list representation for this graph.

Exercise 6

Adjacency List



Give the adjacency list representation for this graph.

Next Class

- Next class reading: Chapter 21: Graph Traversals