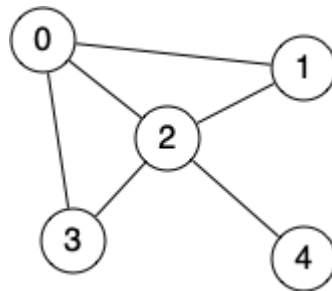# Quiz 4

Deadline	Friday, 03 July 2020 at 11:59PM
Latest Submission	Friday, 03 July 2020 at 11:01AM
Raw Mark	4.00/4.00 (100.00%)
Late Penalty	N/A
Final Mark	4.00/4.00 (100.00%)

Question 1 (1 mark)

Consider the following graph

Which of the following gives a valid adjacency representation of this graph?

(a)

	[0]	[1]	[2]	[3]	[4]
[0]	0	1	1	1	0
[1]	1	0	1	0	0
[2]	1	1	0	1	1
[3]	1	0	1	0	0
[4]	0	0	1	0	0

(b)

	[0]	[1]	[2]	[3]	[4]
[0]	1	1	0	1	0
[1]	1	1	1	0	0
[2]	1	1	1	1	1
[3]	1	0	1	1	0
[4]	0	0	1	0	1

(c)

	[0]	[1]	[2]	[3]	[4]
[0]	0	1	1	1	0
[1]	0	0	1	0	0
[2]	1	1	0	1	1
[3]	0	1	1	0	0
[4]	0	0	1	0	0

(d)

	[0]	[1]	[2]	[3]	[4]
[0]	0	1	1	0	0
[1]	0	0	1	0	0
[2]	1	1	0	1	1
[3]	1	0	1	0	0
[4]	0	0	1	0	0

(e) None of the above is correct

✔ Your response was correct.

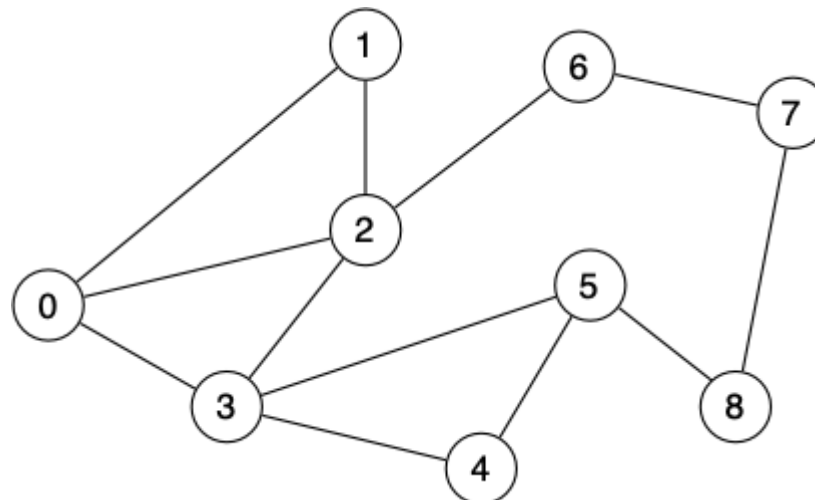Mark: 1.00

The edges are not directed, so the matrix has to be symmetric.

Along each row [v], it has a 1 value for edge incident on v

Question 2 (1 mark)

Consider the following graph

If we used a standard breadth-first search, starting from vertex 0, and giving priority to lower-numbered neighbours, which path would be discovered to reach vertex 8?

(a)	0-3-5-8
(b)	0-3-4-5-8
(c)	0-2-6-7-8
(d)	0-1-2-3-4-5-8
(e)	None of the above paths would be chosen

✔ Your response was correct.
Mark: 1.00

Tracing the execution of the standard BFS path finding algorithm from slides and textbook ...

```
After visiting 0
queue: 1 2 3
visited: 0 0 0 0 -1 -1 -1 -1 -1

After visiting 1
queue: 2 3    (no non-visited edges)
visited: 0 0 0 0 -1 -1 -1 -1 -1

After visiting 2
queue: 3 6
visited: 0 0 0 0 -1 -1 2 -1 -1

After visiting 3
queue: 6 4 5
visited: 0 0 0 0 3 3 2 -1 -1

After visiting 6
queue: 4 5 7
visited: 0 0 0 0 3 3 2 7 -1

After visiting 4
queue: 5 7    (no non-visited edges)
visited: 0 0 0 0 3 3 2 7 -1

After visiting 5
queue: 7 8
visited: 0 0 0 0 3 3 2 7 5

After visiting 7
queue: 8      (no non-visited edges)
visited: 0 0 0 0 3 3 2 7 5

After visiting 8
queue: empty
found
trace path back : 8 5 3 0
```
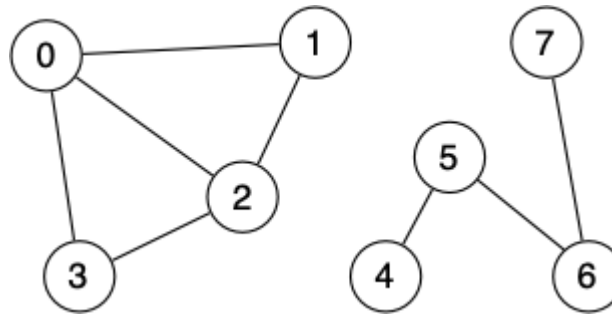
Question 3 (1 mark)

Consider the following graph with two connected components

Which of the following actions would convert this into a graph with a single connected component?

You must choose *all* relevant actions to obtain full marks for this question. There is more than one valid action.

(a) ✓	add an edge between 0 and 5
(b) ☐	add an edge between 5 and 7
(c) ✓	add an edge between 2 and 4
(d) ☐	add an edge between 1 and 3
(e) ✓	add an edge between 0 and 6
(f) ☐	add an edge between 7 and 4

✔ Your response was correct.
Mark: max(0.33 + 0.33 + 0.33, 0) = 1.00

Any edge that joins a vertex from one component to a vertex in the other component is correct.

Joining edges *within* a component does not help.

Question 4 (1 mark)

How many edges are in a complete graph with N vertices?

(a) ○	N-1
(b) ○	N
(c) ○	$\log_2 N$
(d) ◉	N(N-1)/2
(e) ○	N^2

✔ Your response was correct.
Mark: 1.00

In a complete graph, every vertex is connected to every other vertex.

Each of the V vertices has (V-1) edges incident on it => V(V-1) edges

Since each edge handles both (v,w) and (w,v), we divide by two => V(V-1)/2