1. Consider the following adjacency matrix representation of a directed graph (represented as code for nicer formatting):

1 0 0 1

0 1 0 1

0 0 1 0

0 1 1 1

How many edges are in this graph?



2. Consider the same adjacency matrix representation of a directed graph (represented as code for nicer formatting):

1 0 0 1

0 1 0 1

0 0 1 0

0 1 1 1

How many vertices in this graph have a self-loop, i.e. an edge that starts in a vertex and ends at the same vertex it started at?



3. If you have a graph with 5 vertices and 2 edges, how many entries are there in the matrix with an adjacency matrix representation of this graph?



4. Consider the following adjacency list representation of a directed graph:

0 -> {}

1 -> {2, 3}

2 -> {1}

3 -> {0, 2, 3}

4 -> {0, 1, 3, 4}

How many edges does this graph have?



5. Consider the following adjacency list representation of a directed graph:

0 -> {}

1 -> {2, 3}

2 -> {1}

3 -> {0, 2, 3}

4 -> {0, 1, 3, 4}

Which vertex in this graph has the highest *in*-degree?



6. Consider the following adjacency list representation of a directed graph (note: this graph is slightly different from the graph in the previous two questions):

0 -> {}

1 -> {2, 3}

2 -> {1, 3}

3 -> {0, 2, 3}

4 -> {0, 1, 3, 4}

What is the degree sequence for this graph? Make sure you put a single space between each number in the sequence. There should be no commas or additional spaces in the sequence.

Hint: make sure you list the degrees in the correct order.



7. Consider the following adjacency list representation of a directed graph:

0 -> {}

1 -> {2, 3}

2 -> {1}

3 -> {0, 2, 3}

4 -> {0, 1, 3, 4}

Which of the following pairs of vertices have paths from the first vertex to the second. Select all that apply.

From 4 to 0

From 0 to 1

From 1 to 0

From 3 to 4

From 1 to 4