Graph definitions and implementation

10 questions

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?

> 8

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?

> 4

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

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?

> 10

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?

```
3
```

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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 5 4 4 2
```

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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 1 to 0
- ☐ From 3 to 4
- ☑ From 4 to 0
- ☐ From 0 to 1
- ☐ From 1 to 4

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8. How many hours did you spend on the programming assignment this week?

- ○ Less than 1
- ◉ 1-2

○ 2-3

○ 3-4

○ 4-5

○ More than 5

9. How difficult did you find the programming assignment?

○ Very easy

⦿ Pretty easy

○ Neither easy nor difficult

○ Pretty difficult

○ Very difficult

10. How much did you enjoy the programming assignment?

○ I really enjoyed it!

⦿ I enjoyed it.

○ I'm neutral about my enjoyment

○ I did not enjoy it.

○ I really did not enjoy it!

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