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**Started on** Friday, 24 March 2023, 16:45

**State** Finished

**Completed on** Friday, 24 March 2023, 17:43

**Time taken** 58 mins 18 secs

**Marks** 3.00/4.00

**Grade** 7.50 out of 10.00 (75%)

Information

# Week 8: Shortest Paths

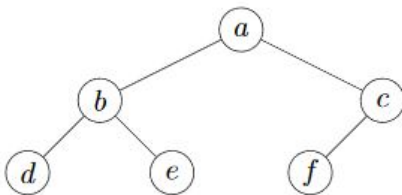
Following chapters from SW for this week are covered in this quiz: SW 4.4

### Question 1

Partially correct

Mark 0.50 out of 1.00

Consider the following graph G:



Which of the following statements are **true**

Select one or more:

- ☐ G is a binary tree rooted at **a**
- ☐ G is a directed graph
- ☐ G has circuits
- ☒ G has 6 connected components
- ☒ Vertex **c** has a degree of 2
- ☐ Vertex **c** and **d** are adjacent

✗

✓

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: G is a binary tree rooted at **a**, Vertex **c** has a degree of 2

Correct

Consider the following undirected graph.

Select one:

- ☒ True ✓
- ☐ False

<https://learnit.itu.dk/mod/quiz/review.php?attempt=91014&cmid=171389>

## Question 3

Partially correct

Mark 0.50 out of 1.00

Consider the following adjacency list.

```
adj[]
+---+
| A | ---> [ -> A | -> B | -> C ]
| B | ---> [ -> A | -> C ]
| C | ---> [ -> A ]
| D | ---> [ -> B | -> E ]
| E | ---> [ -> D | -> C ]
+---+
```

What properties does the graph have?

*Consider drawing to more easily visualize the graph.*

Select one or more:

- ☐ acyclic
- ☒ has self-loops
- ☒ undirected graph
- ☐ has multiple/parallel edges
- ☐ directed graph
- ☐ bipartite



Your answer is partially correct.

You have correctly selected 1.

**Is the graph undirected?** This question is unfortunately vague.

From a graph-theoretic point of view, an undirected graph is something different than a directed graph, mainly because  $\{u,v\}$  is not the same as  $\{(u,v),(v,u)\}$ . For a computer scientist, it makes sense to view an undirected graph is just a directed graph where every edge is present in both directions. The proper term for the latter is sometimes symmetric directed or bidirected graph (but be careful). Furthermore, it becomes a bit more iffy when there are edge weights, because then both directions of the bidirected pair of edges also must have the same weight for it to make sense.

The question accompanies a practical implementation (adjacency list) with a vaguely stated theoretical question, which is troublesome.

The correct answers are: directed graph, has self-loops

## Question 4

Correct

Mark 1.00 out of 1.00

Consider a simple graph  $G$  with the following properties,

- Undirected
- A single connected component
- No self-loops
- No multiple/parallel edges

$G$  has number of vertices  $V$ . What is the lower and upper bound for the number of edges  $E$ ?

Select one:

- ☐  $0 \leq E \leq V - 1$
- ☐  $E = V - 1$
- ☐  $0 \leq E \leq V$
- ☒  $V - 1 \leq E \leq \frac{V \cdot (V - 1)}{2}$



Your answer is correct.

The correct answer is:  $V - 1 \leq E \leq \frac{V \cdot (V - 1)}{2}$