

Q1 What is a graph?

4 Points

Answer the following questions, given that we have an undirected graph $G = (V, E)$.

Q1.1 What is V

1 Point

V is the set of vertices.

True

False

Explanation

By definition.

Q1.2 What is E

1 Point

E is a set of unordered pairs from $V \times V$.

True

False

Explanation

By definition.

Q1.3 Inequality on V and E

1 Point

$|V|$? $|E|$ for all graphs.

- $>$
- $<$
- \geq
- \leq
- None of the others

Explanation

The number of edges could be larger or smaller than the number of vertices.

Q1.4 What is a connected component

1 Point

$|E|$ is the number of connected components.

- True
- False

Explanation

The definition of a connected component is a maximal set of vertices where all pairs of vertices are connected. A pair of vertices is connected if there is a path between the vertices. A path between u and v is a sequence of vertices $u = v_0, \dots, v_k = v$ where $\{v_i, v_{i+1}\} \in E$.

Q2 Example

3 Points

Consider an example graph $G = (V, E)$, with $V = \{A, B, C, D\}$ and $E = \{\{A, B\}\}$.

Q2.1 Counting connected components

1 Point

How many connected components does G have?

- 1
- 2
- 3
- 4

Explanation

The connected components are $\{A, B\}$, $\{C\}$, $\{D\}$ as there is only one edge connecting A and B and therefore only A and B are connected by a path.

Q2.2 Maximum degree

1 Point

What is the maximum degree of any vertex in G ?

- 0
- 1
- 2

Q2.3 Incident

1 Point

What vertices are incident to edge (A, B) ?

B, C

A, B

C, D

A, C

Explanation

Definition of an edge being incident to a vertex is that the ordered pair contains the vertex.