Self Assessment Quiz - Discrete Structures (Lecture 2)

This quiz is ungraded and designed to help you review the key concepts covered in Lecture 2 on Discrete Structures.

1. Define the union of two sets A and B.

2. Given universal set $U = \{a, b, c, d, e, f, g\}$, set $A = \{a, c, e, g\}$, and set $B = \{d, e, f, g\}$, list the elements of $A \cup B$.

3. Explain the difference between union and intersection of two sets.

4. What does the complement of a set A with respect to universe U represent?

5. Using the same sets from question 2, list the elements of $A \cap B$.

6. Describe the set difference $A - B$ and compute it for the sets given in question 2.

7. What property of union is expressed by $A \cup B = B \cup A$? Justify briefly.

8. Draw or describe the Venn diagram representing $A - B$ (set difference).

9. What logical connective's truth table corresponds to the membership table of set union?

10. Explain what a membership table is and how it relates to sets.

11. What is a Venn diagram and why is it useful?

12. Describe one real-world application where Venn diagrams might be useful.

Answers

1. The union of two sets A and B is the set of all elements that belong to A or B or both. Denoted $A \cup B$.

2. $A \cup B = \{a, c, d, e, f, g\}$.

3. Union includes all elements in either set; intersection includes only those elements common to both sets.

4. The complement of A, denoted A^c, is the set of all elements in the universal set U that are not in A.

5. $A \cap B = \{e, g\}$.

6. $A - B$ is the set of elements in A that are not in B. For the sets given, $A - B = \{a, c\}$.

7. The union operation is commutative, meaning order does not affect the result: $A \cup B = B \cup A$.

8. The Venn diagram for $A - B$ is the portion of circle A excluding the overlap with circle B.

9. The truth table for logical OR (disjunction) corresponds to the membership table for union.

10. A membership table lists elements and indicates their presence (1) or absence (0) in sets, similar to truth tables in logic.

11. A Venn diagram visually represents sets as overlapping circles; it helps understand relationships like union, intersection, and complements.

12. Venn diagrams can be used in survey analysis to visualize overlaps between groups, like computer users owning different devices.