1.What is the cardinality of the power set of a set with n elements?

a) n

b) 2n

c) 2^n

d) n!

Answer: c) 2^n

Explanation: The power set of a set with n elements has 2^n elements.

2.Which type of relation allows an element to relate to itself?

a) Symmetric

b) Reflexive

c) Transitive

d) Antisymmetric

Answer: b) Reflexive

Explanation: A relation R on a set A is reflexive if (a, a) ∈ R for all a ∈ A.

3.In how many ways can you arrange n distinct objects in a row?

a) n!

b) 2^n

c) 2n

d) n^n

Answer: a) n!

Explanation: n! denotes the factorial of n, representing the number of permutations of n distinct objects.

4.Which type of function maps distinct elements of the domain to distinct elements of the codomain?
a) One-to-one
b) Onto
c) Into
d) Bijective

Answer: a) One-to-one

Explanation: A function is one-to-one (injective) if distinct elements in the domain map to distinct elements in the codomain.

5.What is the inverse of a function?
a) A function that reverses the order of the elements
b) A function that maps elements of the codomain to elements of the domain
c) A function that squares its input
d) A function that has no inverse

Answer: b) A function that maps elements of the codomain to elements of the domain

Explanation: The inverse of a function f maps elements of the codomain back to elements of the domain such that f(f^(-1)(x)) = x for all x in the codomain.

6.Which theorem proving technique establishes the truth of a statement by assuming the opposite and demonstrating a contradiction?

a) Mathematical induction
b) Proof by contradiction
c) Propositional logic
d) Recursion

Answer: b) Proof by contradiction

Explanation: Proof by contradiction assumes the negation of what is to be proved and demonstrates a logical inconsistency to establish the original statement's truth.

7.What is the order of a group?
a) The number of elements in the group
b) The number of subgroups of the group
c) The highest power of the elements in the group
d) The number of elements in the cyclic subgroup

Answer: a) The number of elements in the group

Explanation: The order of a group is the number of elements it contains.

8.What is a necessary condition for a subgroup to be normal?
a) It contains the identity element.
b) It is a cyclic group.
c) Its left cosets are equal to its right cosets.
d) It is a proper subset of the original group.

Answer: c) Its left cosets are equal to its right cosets.

Explanation: A subgroup H of a group G is normal if and only if its left cosets are equal to its right cosets, i.e., aH = Ha for all a in G.

9.What is the property that distinguishes a field from a ring?
a) Closure under addition and multiplication
b) Existence of additive inverses
c) Existence of multiplicative inverses
d) Commutativity under multiplication

Answer: c) Existence of multiplicative inverses

Explanation: In a field, every nonzero element has a multiplicative inverse, while in a ring, this is not necessarily the case.

10.Which logic operation returns true if and only if both operands are true?
a) Conjunction
b) Disjunction
c) Negation
d) Implication

Answer: a) Conjunction

Explanation: Conjunction (AND) returns true only if both operands are true; otherwise, it returns false.

Related posts:

1. Introduction to Information Security

2. Introduction to Information Security MCQ
3. Introduction to Information Security MCQ
4. Symmetric Key Cryptography MCQ
5. Asymmetric Key Cryptography MCQ
6. Authentication & Integrity MCQ
7. E-mail, IP and Web Security MCQ