Unit 1: Sets and Set Operations

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1. The union of two sets A and B is denoted by:

   a) $A \cup B$

   b) $A \cap B$

   c) $A - B$

   d) $A \times B$

2. If $A = \{2, 4\}$, $B = \{4, 6\}$, then $A \triangle B = ?$

   a) {4}

   b) {2, 4}

   c) {2, 6}

   d) {2, 4, 6}

3. The complement of a universal set U is:

   a) U'

   b) U

   c) $\emptyset$

   d) {0}

4. If $A = \{1,2,3\}$ and $B = \{3,4,5\}$, then $A \cap B$ is:

   a) {4,5}

   b) {1,2}

   c) {3}

   d) {1,2,3,4,5}

5. Which of the following is true for all sets A and B?

a) $A \cap A = \emptyset$

b) $A \cup A = A$

c) $A \cap B = A$

d) $A - A = A$

6. If $A = \{1,2\}$ and $B = \{x,y\}$, then $A \times B$ has how many elements?

a) 2

b) 3

c) 4

d) 6

7. What is the cardinality of the set $A = \{2, 4, 6, 8\}$?

a) 5

b) 3

c) 2

d) 4

8. The number of subsets of a set with n elements is:

a) n!

b) n^2

c) n+1

d) 2n

9. If $A = \{a, b\}$ and $B = \{1, 2\}$, then $(b, 2) \in$?

a) $A \cap B$

b) $A \times B$

c) $B \times A$

d) $A \cup B$

10. The symmetric difference $A \triangle B$ equals:

a) $A \cup B$

b) $(A \cup B)'$

c) $(A - B) \cup (B - A)$

d) $A \cap B$

11. Which of the following is a well-defined set?

a) The set of tasty fruits

b) The set of vowels in English

c) The set of beautiful places

d) The collection of all intelligent students

12. The set $\{x \mid x \text{ is an integer and } x^2 = 4\}$ is:

a) $\{4\}$

b) $\{2\}$

c) $\{-4, 4\}$

d) $\{-2, 2\}$

13. The union of two sets A and B is denoted by:

a) $A \cup B$

b) $A \cap B$

c) $A - B$

d) $A \times B$

14. Which of the following is a well-defined set?

a) The set of tasty fruits

b) The set of vowels in English

c) The set of beautiful places

d) The collection of all intelligent students

15. De Morgan's Law: $(A \cap B)' = ?$

a) $A' \cap B'$

b) $A' \cup B'$

c) $(A \cup B)'$

d) $A - B$

16. The Cartesian product $A \times B$ is not equal to $B \times A$ if:

a) $A \neq B$

b) A or B is empty

c) $A = B$

d) Order matters

17. The Cartesian product $A \times B$ is not equal to $B \times A$ if:

a) $A \neq B$

b) A or B is empty

c) $A = B$

d) Order matters

18. Which of the following is a finite set?

a) Set of natural numbers

b) Set of stars

c) Set of English alphabets

d) Set of integers

19. What is the cardinality of the set $A = \{2, 4, 6, 8\}$?

a) 5

b) 3

c) 2

d) 4

20. Which is not a method of representing a set?

a) Tabular form

b) Graphical form

c) Set-builder form

d) Roster form

21. The complement of a universal set U is:

a) U′

b) U

c) ∅

d) {0}

22. Which is not a method of representing a set?

a) Tabular form

b) Graphical form

c) Set-builder form

d) Roster form

23. A set with only one element is called:

a) Null set

b) Singleton set

c) Power set

d) Subset

24. If A = {1,2,3} and B = {3,4,5}, then A ∩ B is:

a) {4,5}

b) {1,2}

c) {3}

d) {1,2,3,4,5}

25. Which of the following is a well-defined set?

a) The set of tasty fruits

b) The set of vowels in English

c) The set of beautiful places

d) The collection of all intelligent students

26. Which of the following is an empty set?

a) {0}

b) {∅}

c) {}

d) {1,2}

27. If A = {1,2,3} and B = {3,4,5}, then A ∩ B is:

a) {4,5}

b) {1,2}

c) {3}

d) {1,2,3,4,5}

28. If A = {1, 2}, what is the power set P(A)?

a) {{}, {1}, {2}, {1,2}}

b) {{1,2}, {2,1}}

c) {1,2}

d) {{1},{2},{1,2}}

29. The complement of a universal set U is:

a) U′

b) U

c) ∅

d) {0}

30. The number of subsets of a set with n elements is:

a) n!

b) n^2

c) n+1

d) 2n

31. Which is not a method of representing a set?

a) Tabular form

b) Graphical form

c) Set-builder form

d) Roster form

32. Which Venn diagram represents the union of sets A and B?

a) Only overlapping region

b) Only non-overlapping parts

c) Entire area of both circles

d) None

33. The set $\{x \mid x \text{ is an integer and } x^2 = 4\}$ is:

a) {4}

b) {2}

c) {-4, 4}

d) {-2, 2}

34. The union of two sets A and B is denoted by:

a) $A \cup B$

b) $A \cap B$

c) $A - B$

d) $A \times B$

35. Which of the following is a well-defined set?

a) The set of tasty fruits

b) The set of vowels in English

c) The set of beautiful places

d) The collection of all intelligent students

36. The number of subsets of a set with n elements is:

a) n!

b) n^2

c) n+1

d) 2n

37. If A = {1, 2}, what is the power set P(A)?

a) {{}, {1}, {2}, {1,2}}

b) {{1,2}, {2,1}}

c) {1,2}

d) {{1},{2},{1,2}}

38. The Cartesian product A × B is not equal to B × A if:

a) A ≠ B

b) A or B is empty

c) A = B

d) Order matters

39. The set {x | x is an integer and $x^2 = 4$} is:

a) {4}

b) {2}

c) {-4, 4}

d) {-2, 2}

40. If A = {2, 4}, B = {4, 6}, then A △ B = ?

a) {4}

b) {2, 4}

c) {2, 6}

d) {2, 4, 6}

41. Determine whether the following collections are well-defined sets. Justify your answer:
a) The collection of all clever students in your school.
b) The collection of vowels in the English alphabet.
c) The collection of tall buildings in your city.

42. Write the following sets in roster form:
a) A = { x | x is an even natural number less than 12 }
b) B = { x | x is a letter of the word 'SCHOOL' }

43. Write the following sets in set-builder form:
a) P = {2, 4, 6, 8, 10}
b) Q = {Sunday, Monday, Tuesday, Wednesday}

44. Which of the following are equal sets? Explain why.
A = {1,2,3,4}, B = {4,3,2,1,1,2}, C = {x | x is a natural number less than 5}

45. State whether each of the following is finite, infinite, or not a set:
a) The set of even numbers less than 50
b) The set of stars in the sky
c) The set of most popular songs

46. Consider the following collections. Which are sets and which are not sets?
a) All prime numbers between 10 and 30
b) All tasty fruits
c) All the rivers in India

47. Let X = {1,2,3,4,5}. Which of the following collections are subsets of X?
a) {2,4}
b) {0,1}
c) {1,2,3,4,5}

48. Remove repetitions and write the following as a set in roster form:
a) {a, a, b, c, c, c, d}
b) The letters of the word 'MISSISSIPPI'

49. List the elements of the following sets:
a) A = { x | x is a factor of 18 }
b) B = { x | x^2 = 9, x ∈ Z }

50. Decide which of the following pairs of sets are equal, equivalent, or neither:
a) A = {1,2,3}, B = {3,2,1}
b) C = {a,b,c}, D = {c,b,a,d}
c) E = { vowels in 'APPLE' }, F = {a,e}