

**Discrete Mathematics (BCSC 1010)**

**Practice Questions on Sets**

1. List the members of these sets.

a) {x | x is a real number such that x2 = 1}

b) {x | x is a positive integer less than 12}

c) {x | x is the square of an integer and x < 100}

d) {x | x is an integer such that x2 = 2}

2. Use set builder notation to give a description of each of these sets.

a) {0, 3, 6, 9, 12}

b) {−3, −2, −1, 0, 1, 2, 3}

c) {m, n, o, p

3. Determine whether each of these statements is true or false.

a) 0 ∈ ∅

b) ∅∈{0}

c) {0}⊂∅

d) ∅⊂{0}

e) {0}∈{0}

f ) {0}⊂{0}

g) {∅} ⊆ {∅}

4. Use a Venn diagram to illustrate the relationships A ⊂ B and B ⊂ C.

5. What is the cardinality of each of these sets? a) ∅ b) {∅} c) {∅,{∅}} d) {∅,{∅},{∅,{∅}}}

6. Find the power set of each of these sets, where a and b are distinct elements.

a) {a} b) {a, b} c) {∅,{∅}}

7. Find the number of mathematics students at a college taking at least one of the languages French, German, and Russian, given the following data: 65 study French, 20 study French and German, 45 study German, 25 study French and Russian, 8 study all three languages. 42 study Russian, 15 study German and Russian.

8. Suppose among 32 people who save paper or bottles (or both) for recycling, there are 30 who save paper and 14 who save bottles. Find the number m of people who: (a) save both; (b) save only paper; (c) save only bottles.

9. A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C#, 20 in Python, 6 in C# and Java, 1 in Java and Python, 5 in C# and Python, and just 1 programmer is proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.

10. Prove the Distributive Law: A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C).

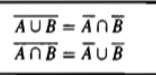
11. Show that if A and B are sets, then A − (A − B) = A ∩ B.

12. Show that: (B-A) U(C-A) =(BUC)-A.

13. Prove that: (A – B) ∩ (C – B) = (A ∩ C) – B.

14. Prove that: Ax(BUC)=(AXB)U(AXC).

15. Prove that: AX(B∩C)=(AXB) ∩(AXC).

16. Prove both Demorgan’s laws.

17. Two finite sets have and elements. The total number of subsets of the first set is 56 more the total number of subsets of the second set. Find the values of and .