Work Sheet- 2 for class- Ten
Chapter- Two
Sets and Function
Exercise-2.1
Creative Questions:

1. **L = {x: x is an integer and $x^2 < 9$}, M = {−2, 0, 2}, N = {0, 1, 2} and S = {(x, y): x ∈ L, y ∈ L and x – y = 1}** **[My.B.- 20]**

a) Add: $7.0\dot{5} + 3.2\dot{7}\dot{3}$.

b) Prove that, M ∪ N = (M\N) ∪ (N\M) ∪ (M ∩ N).

c) Express the relation 'S' in tabular method and find its range.

2. **Universal set ∪ = {x: x ∈ ℕ and $x^2 < 53$}, A = {x ∈ ℕ: x is prime number and x < 10}, B = {4, 5} and C = {x ∈ ℕ: $x^2 > 7$ and $x^3 < 136$}** **[Ctg.B.- 20]**

a) Express A and C in tabular method.

b) Prove that, (A ∩ B) ∪ (B ∪ C) = (A ∪ B) ∩ C.

c) Determine P(B′ − A′).

3. **(i) A = 2x – 1, where x ∈ ℕ.**
(ii) B = {x ∈ ℕ: $x^2 < 10$} and C = {x ∈ ℕ: 2 < x ≤ 7 and x is prime number}. **[J.B.- 20]**

a) If S = {x ∈ ℕ: $x^2 > 15$ and $x^3 < 225$} then express S in tabular method.

b) Prove that, square root of A is an irrational number, where x = 3.

c) If S = {(x, y): x ∈ B, y ∈ C and y = x + 1}, express S in tabular method and determine domain and range.

4. **A = {2, 4, 7}, B = {x ∈ ℤ : - 2 ≤ x ≤ 2} and S = {(x, y): x ∈ B, y ∈ B and y – 2x = 0}** **[R.B.- 19]**

a) Express the set C = {x ∈ ℕ : $x^2 – 9 = 0$} in tabular method.

b) By determining the set P(A), justify that the number of elements of P(A) is equal to 2^n, where the element of A is n.

c) By expressing S in tabular method then determine Dom S.

5. **$F(x) = x^4 + 3x^3 + ax^2 - 3x - 4 + a$, $G(p) = \frac{3p^2 - p^3 - 1}{p(p-1)}$.** **[C.B.- 19]**

a) Find the value of G(−1).

b) Determine the value of 'a' when F(−2) = 0.

c) Prove that, $G\left(\frac{1}{p}\right) = g(1 - p)$.

6. **$F(x) = \frac{5x^2 + 3}{5x^2 - 3}$, $S = \{(x, y) : x \in C,\ y \in D \text{ and } 2x + y < 10\}$, C = {1, 3, 5} and D = {2, 4, 7}.** **[D.B.- 19]**

a) Divide $0.\dot{3}$ by $0.2\dot{2}$.

b) Find the value of $\frac{F\left(\frac{1}{t^2}\right) - 1}{F\left(\frac{1}{t^2}\right) - 1}$.

c) Expressing the relation S in tabular method find the domain of it.

7. **i) $A = \{x \in \mathbb{Z} : 1 \le x^2 \le 7\}$ and $R = \{(x, y) : x \in A, y \in A \text{ and } y - 2x - 1 = 0\}$.**
ii) $f(x) = \frac{1}{x-1}$ **[J.B.- 19]**

a) Add: $2.30\dot{4} + 2.0\dot{2}\dot{5}$.

b) According to the stem find the range of R from no (i).

c) Show that, $f(m) - f(n) \neq f\left(\frac{mn}{n-m}\right)$ from (ii).

8. **Universal set ∪ = {1, 2, 3, 4, a, b, c, d}**
M = {x ∈ ℕ : $x^3 \ge 8$ and $x^4 \le 256$}
N = {y: y^2 – (c + d)y + cd = 0}
and $f(x) = \frac{5x - 7}{2x - 3}$. **[Dj.B.- 19]**

a. If A = {11, 20}and B = {20, a} then determine P(A∩B).

b. In the light of stem prove that, $(M \cup N)' = M' \cap N'$.

c. If $\frac{f(x^{-1}) + 2}{f(x^{-1}) - 1} = 3$ then find the value of x according to the light of stem.

9. **A = {3, 4, 5, 6}, B = {0, 1, 2} and R = {(x, y): x ∈ A, y ∈ A and x – y = −1}** **[All B.- 18]**

a. Show that, A and B are disjoint sets.
b. Determine P(A) and show that the number of elements of P(A) supports 2^n, where n is the number of elements of A.
c. Express R in tabular method and determine Dom R and Range R.

10. **Universal set U = {x : $x \in \mathbb{N}$ and $x^2 < 50$}, A = {$x \in \mathbb{N}$: x is prime number and x < 8}, B = {4, 5} and C= {$x \in \mathbb{N}$: $x^2 > 5$ *and* $x^3 < 130$}** **[J.B.- 17]**
a) Express A and C in tabular method.
b) Prove that, $(A \cup B) \cap C = (A \cap B) \cup (B \cup C)$.
c) Find the value of $P(B' - A')$.

11. **U = {1, 2, 3, 4, 5, 6, 7}, A = {x $\in \mathbb{N}$: $x^2 > 15$ and $x^3 < 225$}, B = {x $\in \mathbb{N}$: 4 $\leq$ x $\leq$ 7} and C = A $\cup$ B.** **[R.B.- 16]**
a) Express set A by tabular method.
b) Prove in the light of the stem that $(A \cap B)' = A' \cup B'$.
c) If n is the number of elements of C, show that the number of elements of P(C) supports 2^n.

12. **A = {x : x $\in \mathbb{N}$ and x^2 – 5x + 6 = 0}, B = {x : x $\in \mathbb{N}$ and 2 < x < 6} and C = {2, 4, 6}.** **[Ctg.B.- 16]**
a) Express set A by tabular method.
b) Prove that, $(A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$.
c) Determine P(B). If the elements of set B are n, show that the number of elements of P(B) supports 2^n.

13. **U = {x : x $\in \mathbb{Z}$ and $x^2 < 10$}, A = {x : x, natural factor of 12}, B = {x $\in \mathbb{N}$: x^2 – 3x + 2 = 0} and C = {0, 1, 2, 3}** **[D.B.- 15]**
a) Express $\cup$ roaster method.
b) Verify: $(A \cup B)' = A' \cap B'$.
c) Determine P(C) and show that the number of elements of P(C) is 2^n.

14. **A = {x : x $\in \mathbb{N}$ and $x^2 - 8x + 15 = 0$}, B = {1, 3}, C = {2, 3} and D = {a, b, c}.** **[R.B.- 15]**
a) Express A in roaster method.
b) Prove that, $A \times (B \cap C) = (A \times B) \cap (A \times C)$.
c) Determine P(D) and show that the number of elements of P(D) is 2^n.

15. **P = {x : x $\in \mathbb{N}$ and $x^2 - 7x + 6 = 0$}, Q = {x: x $\in \mathbb{N}$ and 1 $\leq$ x < 5} and R = {2, 4, 6}.** **[Ctg.B.- 15]**
a) Express set P in tabular method.
b) Prove that, $(P \setminus Q) \cup (Q \setminus P) = (P \cup Q) \setminus (P \cap Q)$.
c) Show that, $P \times (Q \cup R) = (P \times Q) \cup (P \times R)$.

16. **U = {1, 2, 3, 4, 5, 6, 7}, A = {x : x $\in \mathbb{N}$ and x^2 – (a + b)x +ab = 0}, B = {x : x $\in \mathbb{N}$; $x^2 > 15$ and $x^3 < 225$} and C = {x $\in \mathbb{N}$: 4 < x $\leq$ 7}.** **[S.B.- 15]**
a) Express set A in tabular method.
b) Prove that, $(B \cup C)' = B' \cap C'$.
c) Find the value $A \times (B \cup C)$ and $A \times (B \cap C)$.

17. **A = {x: x $\in \mathbb{N}$ and x^2 – 5x + 6 = 0}, B = {1, 4} and C = {a, 4}.** **[Dj.B.- 15]**
a) Determine set A in tabular method.
b) Determine P(B $\cup$ C) and show that the number of elements of P(B $\cup$ C) supports 2^n.
c) Show that, $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

18. **A = {x: $\mathbb{N}$: x^2 – 5x + 6 = 0}, B = {3, 4} and C = {2, 4}.** **[J.B.- 15]**
a) Express set A in tabular method.
b) Show that, $P(B \cap C) = P(B) \cap P(C)$.
c) Prove that, $A \times (B \cup C) = (A \times B) \cup (A \times C)$.

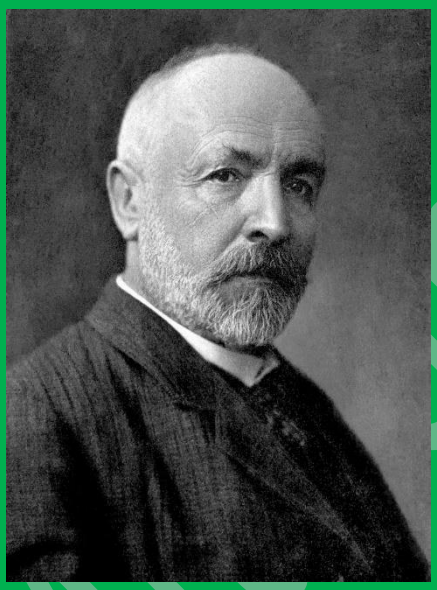
19. **Of 100 students 65 passed in Bangla, 48 in both Bangla and English and 15 failed in both the subjects.**
a) Express the above in Venn diagram along with brief description.

b) Determine the number of students who passed only in Bangla or passed only in English.
c) Determine the union of the sets of prime factors of number of students passed and failed in both the subjects

20. **$P = \{x: x \in \mathbb{N}$ x is the factor of 52$\}$, Q = {x: x is the all positive odd number $\leq$ 15} and R = {x: x is whole number and $x^2 < 15$}.**

a) Express P and Q in tabular method.
b) Express R in tabular method and express P and Q in Venn diagram.
c) Find P ∩ Q and (P ∪ Q) ∩ R.

Basic Information:



- **German mathematician Georg Cantor (1845 – 1918) is the father of Modern Set Theory.**
- **He recognized that there may be different size of infinite set.**
- **He invented all the symbols of real number which are used at present.**

- **Leonhard Euler (1707 – 1783) was a prolific mathematician whose work spanned the fields of Geometry, Calculus, Trigonometry and Algebra.**
- **Euler was the first to introduce the notation for a function f(x).**
- **He also popularized the use of the Greek letter π to denoted the ratio of a circle's circumference to its diameter.**
- **Two most famous numbers in mathematics ℮ (Euler's number) and r (Euler-Mascheroni Constant or Euler's Constant) were named after him.**
- **He is the pioneer of signs used in modern trigonometry.**
- **He used Σ to denote sum, and i to denote infinite numbers and used π first.**