1. Find number of mathematics students taking **at least one of the three languages** French (F) German (G) or Russian (R) considering the following data. Use Inclusion Exclusion principle.

Language	No of students studying
French	65
German	45
Russian	42
French and German	20
German and Russian	15
Russian and French	25
French and German and Russian	8

    Also find the number of students who studying only French , and who study German and French but not Russian.

2. find the number of integers between 1 and 1000 which are not divisible by 3,5 and 7. Use Inclusion Exclusion Principle.

3. If A= {p, q} , B= {q, r}, C= {r, t} then find (i) A× $(B \cup C)$ (ii) A× $(B \cap C)$

4. For the given relation R defined on A= {1, 2, 3, 4} ;

    R={(1,1), (1,2),(2, 2), (2, 1), (2, 3), (3, 3), (3, 4), (4, 3), (4, 4)}

    find   (i) Dom (R)   (ii) Range (R)   (iii) R^{-1}

5. If U = { 1, 2, 3, 4, …, 20 }, A = { 2 , 4, 6, 8, 10, 12, 14, 16, 18, 20}, B = {1, 3, 5, 7, 10, 15, 18, 20},

    C = {1, 2, 6, 8, 17, 19, 20}, Find   (i) $|A - B|$ (ii) $|(B \cap C)'|$ (iii) $|B' - (A \cap C)|$

6. Define predicates and proposition and verify that the following statement is logically equivalent. ~ $(p \leftrightarrow q) \equiv (p \wedge \sim q) \vee (\sim p \wedge q)$

7. state whether the following statement is tautology or contradiction. $(p \wedge (p \rightarrow q)) \rightarrow q$

8. Determine whether the statements in (a) and (b) are logically equivalent.

    Assume x is a particular real number.

    a. $x < 2$ or it is not the case that $1 < x < 3$.   **b.** $x \leq 1$ or either $x < 2$

9. Write inverse and converse of "If today is Easter, then tomorrow is Monday".

10. Sharky, a leader of the underworld, was killed by one of his own band of four henchmen. Detective Sharp interviewed the men and determined that all were lying except for one. He deduced who killed Sharky on the basis of the following statements:

    Socko: Lefty killed Sharky

    Fats: Muscles didn't kill Sharky

    Lefty: Muscles was shooting craps with Socko when Sharky was knocked off

    Muscles: Lefty didn't kill Sharky

    Who killed Sharky and why?