**INCLUSION – EXCLUSION PRINCIPLE (PRACTICE PROBLEMS)**

1. In a discrete mathematics class every student is a major in computer science or mathematics, or both. The number of students having computer science as a major (possibly along with mathematics) is 25; the number of students having mathematics as a major (possibly along with computer science) is 13; and the number of students majoring in both computer science and mathematics is 8. How many students are there in this class?

2. How many positive integers not exceeding 1000 are divisible by 7 or 11?

3. Using inclusion – exclusion principle, find the number of positive integers not exceeding 500 which are divisible by at least one of 9 or 15 .

4. Suppose that there are 1807 freshmen at a school. Of these, 453 are taking a course in computer science, 567 are taking a course in mathematics and 299 are taking a course in both computer science and mathematics. How many are not taking a course either in computer science or mathematics?

5. A total of 1232 students have taken a course in Spanish, 879 have taken a course in French and 114 have taken a course in Russian. Among them, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian and 14 have taken courses in both French and Russian. If 2092 students have taken at least one of Spanish, French and Russian, how many students have taken a course in all three languages?

6. A survey of households in the United States reveals that 96% have at least one television set, 98% have telephone service and 95% have telephone service and at least one television set. What percentage of households in the United States have neither telephone service nor a television set?

7. Determine the number of positive integers not exceeding 100 which are not divisible by 2, 3 or 5.

8. Determine the number of positive integers between 1000 and 2000 (including both) which are not divisible by 4, 5 or 7.

9. Determine the number of positive integers between 2000 and 3000 (excluding both) which are divisible by 4, 5 or 7.

10. Determine the number of positive integers between 2000 and 3000 (including both) which are divisible by 4, 6 or 7.