DISCRETE MATHEMATICS 1
PART 3. THE INCLUSION-EXCLUSION FORMULA.

1. How many integers from 1 to 1000 are divisible by none of:
   a) $2, 6, 13$;
   b) $3, 7, 11$;
   c) $6, 63, 144$.

2. Each of class of 50 students reads at least one of mathematics and physics, 30 read mathematics and 27 read both. How many read physics?

3. a)How many ways are there of placing 5 non-takin rooks on 5×5 board?
   b) How many ways if none lie on the main diagonal?
   c) How man ways if exactly one lies on the main diagonal?

4. There are n hats. Each person takes randomly chosen hat. How many possible outcomes are there in which no person gets their own hat?

5. How many permutations are there of the digits $1, 2, 3, 4, 5, 6, 7, 8$ in which none of the patterns 12, 34, 56, 78 appears?

6. Given $2n$ letters, two of each of n types. How many arrangements of these letters are there with no pair of consecutive letters the same?

7. Given are n pairs of shoes. How many ways are there to arrange them in a line in such a way that shoes of the same pair are not neighbours.