

LIST OF PROBLEMS IN PERMUTATIONS, COMBINATIONS AND DISTRIBUTIONS

1. Find the number of ways in which 3 exams can be scheduled in a 5 day period such that
 - a. No two exams on same day
 - b. No restriction on number of exams on a day
2. Determine the number of 4 digit numbers that can contain distinct digits.
3. How many odd integers between 100 and 999 have distinct digits?
4. How many of the first thousand positive integers have distinct digits?
5. Find the number of permutations of the word '*INSTITUTION*'.
 - a. How many of these begin with *I* and end with *N*.
 - b. How many permutations are there with 3- *T*'s not together?
 - c. How many of these begin with *I*?
6. In how many ways, 3 integers can be selected from $3n$ consecutive integers so that the sum is a multiple of three?
7. How many ways one right and one left shoe can be selected from six pairs of shoes without obtaining a correct pair?
8. In how many ways can 12 white and 12 black pawns can be placed on black squares of an 8×8 chess board?
9. Suppose repetitions are not allowed,
 - a. How many four digit numbers can be formed from six digits 1, 2, 3, 5, 7, and 8?
 - b. How many of numbers in question 'a' are less than 4000?
 - c. How many of numbers in question 'a' are even?
 - d. How many of numbers in question 'a' are odd?
 - e. How many of numbers in question 'a' are multiples of 5?
 - f. How many of numbers in question 'a' contain both digits 3 and 5?
10. How many positive integers less than one million can be formed using
 - a. only 7, 8, and 9
 - b. only 0, 8, and 9
11. A license plate has two letters followed by 4 digits with first digit other than zero. How many different license plate can be formed?
12. Find the number of distinguishable words that can be formed from the letters of '*MISSISSIPPI*'?
13. A new nation's flag has to be designed with 6 vertical strips in Yellow, Green, Blue and Red. In how many ways this can be done so that no two adjacent strips have same color?
14. In how many ways can a lady wear 5 rings on her fingers (not on thumb) of her right hand?
15. In how many ways you can select 3 days out of 7 days with repetition allowed? Also, find number of ways to list 7 days of 3 days?
16. There are 15 TRUE or FALSE questions in an examination. In how many ways can a student do the examination if he or she can also choose not to answer some of the questions?
17. Determine number of ways to seat 5 boys in a row of 12 chairs?

18. Find the sum of all 4-digit numbers that can be obtained by using the digits 1,2,3,4 once in each.
19. How many different ways can 5 messages be delivered by 3 messengers if no messenger is left unemployed? The order in which the messenger delivers messages is immaterial.
20. In how many ways can an examiner assign 30 marks to 8 questions so that no question receives not less than 2 marks?
21. A shop sells 6 different flavors of ice-creams. In how many ways a customer can choose 4 ice-cream cones if,
- They are all of different flavors
 - Not necessarily different flavors
 - Contain only 2 or 3 flavors
 - Contain 3 different flavors
22. Three identical dice are rolled. How many different outcomes can be recorded?
23. There are 9 different books on a shelf, 4 are red and 5 green bindings. How many different ways to arrange these books if
- There is no repetition
 - Red books must be together and green books must be together
 - Red books must be together and green need not be together
 - No two books of same color can be together.
24. Out of 5 mathematicians and 7 physicists, a committee consisting of 2 math and 3 physicist has to be formed. In how many ways it could be done if,
- There is no restriction
 - One particular physicist must be included
 - 2 particular mathematicians cannot be in a committee
25. A committee of k-people has to be chosen from a set of 7-women and 4-men. How many ways are there to form the committee if
- Committee has 5 people, 3-women and 2 men
 - Committee can be of any positive size but must have equal number of men and women
 - Committee has 4 people, 1 must be Mr. X
 - Committee has 4 people, at least two are women
 - Committee has 4 people, 2 of each sex, Mr. X and Mrs. X cannot be in the same committee.
26. A student has to answer 12 of the 15 questions in an exam. How many choices does the student have
- In total
 - If he must answer the first- 2 questions
 - If he must answer first or second but not both.
 - If he must answer exactly 3 of the first 5 questions
 - If he must answer at least 3 out of the first 5 questions.

27. Mr. A has to visit one of the 12 temples on each evening of a given week. In how many ways we can plan his walk if he will not visit a temple more than once?
28. Given integers 1, 2, 3...11 two groups are made, the first group contains 5 integers and second group contains 2 integers. In how many ways can the selections be made with unrestricted repetitions if,
- There are no further restrictions
 - A group contains either all odd or all even integers
- If no repetitions are allowed, in how many ways can the selection be made such that the smallest element in the first group is larger than the largest number of the second group?
29. Find the number of squares of all possible sizes in an 8x8 chess board.
30. How many ways are there to distribute 4 identical oranges and 6 distinct apples into 5 distinct boxes such that each box gets exactly two fruits?
31. Find the number of ways in which strings of four distinct letters followed by three distinct digits.
32. Find the number of ways of placing 3 distinctly colored balls into 10 distinctly numbered boxes without any restriction on number of balls in a box.
33. Suppose we print all 5 digit numbers on slips of paper with one number on each slip (include numbers beginning with 0). However since the digits 0,1,6,8,9 become 0,1,9,8,6 when they are read upside down, there are pairs of numbers that can share same slip. For example 61891 and 16819 can share same slip. How many different slips of paper is required if this type of sharing is allowed?
34. If no three diagonals of a convex decagon meet at the same point, into how many line segments are the diagonals divided by their intersections?
35. How many points of intersection are formed by n -lines drawn in a plane if no two are parallel and no three are concurrent?