SOLVING PROBLEMS ABOUT COMBINATORICS AND PLACEMENTS IN A CIRCLE

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Abstract. Properties of combinatorics and special approaches to solving some problems are presented.

Keywords. Elements of combinatorics, unique placements and placements around a round table.

If we look at the history of combinatorics, we can see that several thousand years ago in China and Greece, the problems of number theory were first studied, and in our country, the scientist of M.Ulugbek school in Samarkand Ghiyosiddin Jamshid Koshi and the mathematical poet Omar Khayyam, who lived and created in the 10th century, later appears in the works of European scientists B. Pascal, J. Cordano, G. Leibniz, J. Bernoulli, P. Fermat, L. Euler and other scientists. Combinatorics is a branch of mathematics that studies combinatorics. (unions) are called. Combinatorics deals with ordered finite sets. Any combinatorial problem can be reduced to the problem of finite sets and their reflection.

Addition rule: If set A consists of n elements and set B has m elements, and these two sets do not intersect, then A consists of all elements of A and B The set ∪ B has n + m elements.

Multiplication rule. If element A_1 is selected by n_1 methods, after each such selection element A_2 is selected by n_2 methods, and similarly after each (k-1) – selection, element A_k is selected by n_k methods, then all elements A_(1,) A_2,…A_n can be selected in order n_1,n_2…n_k. |C|=|A|·|B|

Structures made up of objects are called combinations. Three different types of combinations are studied: permutations, substitutions, and conjunctions.

Arrangements made from k elements of the set X with m elements are referred to as ordered subsets of the set X of length k, where k≤m. Their number

$$A_m^k = m(m-1)\dots\big(m-(k-1)\big).$$

Repeated permutations of m-element X set elements and k elements whose components are repeated.

$$\overline{A}_m^k = m^k.$$

When solving problems related to combinatorics, it is possible to make the various situations that arise according to the condition of the problem more convenient. First, let's consider the solution of the problems of circular arrangement of unique arrangements consisting of a set of n elements in combinatorics.

The number of unique n sets consisting of a set of n elements in total (n-1)! is equal to

Issue 1:

In how many different ways can 6 people sit at a round table?

Solving. According to the above (6-1)!=1*2*3*4*5=120

Issue 2:

A total of 6 people live in the family. How many different ways can a family sit at a round table, as long as the parents sit next to each other?

Solving. Placement of 5 people in a circle (n-1) if we consider them as one according to the condition of being next to each other except for the parent pair! according to (5-1)!= 1*2*3*4=24 different situations are generated, and the parent exchange is 2! i.e.=1*2=2, the solution to the problem is 4!*2!=24*2=48

Issue 3:

In how many different ways can the Sardar, deputy and secretary from an academic group of 8 people be seated side by side at a round table?

Solving. If the captain, deputy and secretary are placed next to each other 1 and the rest are 5, the total is (6-1)!=1*2*3*4*5=120 and 3 people from 3!=1*2*3 6!*3!=120*6=120 can be placed in different ways.

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