

richard brualdi introductory combinatorics pdf

A k-combination with repetitions, or k-multicombination, or multisubset of size k from a set S is given by a sequence of k not necessarily distinct elements of S, where order is not taken into account: two sequences define the same multiset if one can be obtained from the other by permuting the terms. In other words, the number of ways to sample k elements from a set of n elements allowing for ...

Combination - Wikipedia

An inversion of a permutation \bar{f} is a pair (i,j) of positions where the entries of a permutation are in the opposite order: $i < j$ and $\bar{f}_i > \bar{f}_j$. So a descent is just an inversion at two adjacent positions. For example, the permutation $\bar{f} = 23154$ has three inversions: (1,3), (2,3), (4,5), for the pairs of entries (2,1), (3,1), (5,4).. Sometimes an inversion is defined as the pair of values ...

Permutation - Wikipedia

A permutation of a set S is a bijection from S to S. In other words, it is a one-to-one correspondence between the elements of S and themselves. For example, the permutation $\bar{f} = 23154$ maps 1 to 2, 2 to 3, 3 to 1, 4 to 5, and 5 to 4. The identity permutation maps each element to itself. The inverse of a permutation \bar{f} is the permutation \bar{f}^{-1} such that $\bar{f}^{-1}(\bar{f}(i)) = i$ and $\bar{f}(\bar{f}^{-1}(j)) = j$. For example, the inverse of $\bar{f} = 23154$ is $\bar{f}^{-1} = 32145$. The composition of two permutations \bar{f} and \bar{g} is the permutation $\bar{g} \circ \bar{f}$ defined by $(\bar{g} \circ \bar{f})(i) = \bar{g}(\bar{f}(i))$. For example, the composition of $\bar{f} = 23154$ and $\bar{g} = 32145$ is $\bar{g} \circ \bar{f} = 31245$. The cycle notation for a permutation is a way of representing a permutation as a product of cycles. For example, the permutation $\bar{f} = 23154$ can be written as $(123)(45)$. The sign of a permutation is a number ± 1 that indicates whether the permutation is an even or odd permutation. For example, the permutation $\bar{f} = 23154$ has sign -1 because it is an odd permutation. The symmetric group S_n is the group of all permutations of a set of n elements. The alternating group A_n is the subgroup of S_n consisting of all even permutations of a set of n elements. The cycle index of a permutation is a polynomial that encodes the cycle structure of the permutation. For example, the cycle index of the permutation $\bar{f} = 23154$ is $z_1^2 z_2^2 z_3^1$. The cycle index of a permutation is a useful tool for counting the number of orbits of a permutation group acting on a set. For example, the cycle index of the permutation group S_n acting on a set of n elements is $\frac{1}{n!} \sum_{\bar{f} \in S_n} z_1^{c_1} z_2^{c_2} \dots z_n^{c_n}$, where c_i is the number of cycles of length i in the permutation \bar{f} .

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