discreet

alexander

May 8, 2025

1 permutations

The permutation formula is used to find the number of ways to arrange r items from a set of n items, where order matters

$$nPr = \frac{n!}{(n-r)!}$$

- n is the total number of items in the set
- r is the number of items being chosen from the set

If we want to choose r items, we need to exclude the last $(n-r)$ items from the factorial. That's why we divide by $(n-r)!$

2 combinations

Combinations are used to find the number of ways to choose r items from a set of n, where order does not matter

$$nCr = \frac{n!}{r!(n-r)!}$$

- n is the total number of items in the set
- r is the number of items being chosen from the set

3 terms

- repetition: when an object can be chosen more than once. this is often indicated by allowing duplicate items within a selection
- order (arrangement): order matters in combinatorial problems where the arrangement of selected objects influences the outcome
- replacement: when the choice or selection does not exclude the possibility of picking an item more than once from the original pool

4 misc.

- binary decision diagram and trees:
- pigeonhole principle:
- stirling numbers:
- bell numbers:
- multinomial coefficients:
- permutations with fixed points and cycles:
- lattice theory:
- generation functions:
- recurrence relations: