

Combinatoric Standard Problems

SP #1 Find the number of strings of length k that use elements from a given set of size n .

$$n^k$$

SP #2 Find the number of strings of length k that use elements from a given set of size n if no element appears more than once in any string.

$$\frac{n!}{(n-k)!}$$

SP #3 Find the number of combinations of length k that consist of distinct elements from a given set of size n .

$$\binom{n}{k}$$

SP #4 Find the number of bit strings of length k such that there are no two consecutive 1s.

SP #5 Find the number of combinations of length k that use elements from a given set of size n , allowing repetition and with no missing elements.

$$\binom{k-1}{n-1}$$

SP #6 Find the number of combinations of length k that use elements from a given set of size n , allowing repetition.

$$\binom{n+k-1}{k}$$

SP #7 Find the number of 0-dominated bit strings that contain a given number of 0s and 1s.

SP #8 Find the number of distributions of k distinct balls into n distinct boxes. Equivalently, find the smallest number of functions from one set to another.

$$n^k$$

SP #9 Find the number of distributions of k identical balls into n distinct boxes.

$$\binom{n+k-1}{k}$$

SP #10 Find the number of distributions of k identical balls into n distinct boxes, if no boxes are allowed to be empty.

$$\binom{k-1}{n-1}$$

SP #11 Find the number of distributions of m distinct balls into n distinct boxes, if each box must contain a specified number of balls, m_i , $1 \leq i \leq n$.

$$\frac{m!}{m_1 \cdot m_2 \cdots m_n}$$

SP #12 Find the number of rearrangements of a given string of length m with n distinct letters, each occurring m_i times.

$$\frac{m!}{m_1 \cdot m_2 \cdots m_n}$$

SP #13 Find the number of distributions of a set of distinct balls into a set of distinct boxes, if no boxes are allowed to be empty.

SP #14 Find the number of strings of a given length from a given set of letters, if each letter must occur at least once in the word.

SP #15 For a given set, find the number of partitions of a given type.

SP #16 For a given set, find the number of partitions that have a specified number of nonempty parts.

SP #17 Find the number of partitions of a given positive integer that have a specified number of positive parts.

Ways to Arrange, Select, or Distribute k Objects from n Items or into n Boxes

	Arrangement (ordered outcome) <i>or</i> Distribution of distinct objects	Combination (unordered outcome) <i>or</i> Distribution of identical objects
No Repetition	$\frac{n!}{(n-r)!}$	$\binom{n}{r}$
Unlimited Repetition	n^r	$\binom{n+r-1}{r}$
Restricted Repetition	$\frac{n!}{r_1 \cdot r_2 \cdots r_m}$	N/A