Formulas for Distributions.

How many ways can one distribute k balls to n distinct boxes?

Assumption 1. No bound on the number of balls per box.

Each box must get a ball?

		Yes	No
Balls distinct?	Yes	$n!S(k,n)$	n^k
	No	$\binom{k-1}{n-1}$	$\binom{n+k-1}{n-1}$

Assumption 2. Each box gets at most one ball (so $k \leq n$).

Each box must get a ball?

		Yes (so $k = n$)	No
Balls distinct?	Yes	$n!$	$(n)_k$
	No	1	$\binom{n}{k}$

(1) How many ways are there to distribute 12 different books to 3 people? What if each person must get at least one book?

(2) How many ways are there to distribute 12 identical textbooks to three shelves? How many ways to distribute 12 different books to three shelves?

(3) How many positive integral solutions are there to the equation $x_1+x_2+x_3+x_4+x_5+x_6 = 100$? How many nonnegative integral solutions are there?

(4) How many ways are there to make 3 fruit baskets from 8 pineapples, 10 pomegranates, 6 coconuts and 20 figs if each basket must contain each kind of fruit?