

(F4)

Rep. #ways to choose k of n distinct objects:

rep OK:

order
rel.
 n^k order
invel.
?rep not OK: $P(n, k)$ $\binom{n}{k}$ ex. $n=4, k=2$: 10 ways.• Reformulate: k id. balls in n different boxes k stars, $n-1$ bars

$$\leadsto \# = \binom{n-1+k}{k}.$$

Ex. Find #solutions to a) $x_1 + \dots + x_5 = 13, x_i \in \mathbb{N}$.b) $\dots \leq \dots$ Ex.

if more time: Find #sequences of 15 A's, 5 B's such that at least two A's occur between every pair of B's.

...or directly: #sols to $x_1 + \dots + x_6 = 15, x_i \in \mathbb{N}, x_2, x_3, x_4, x_5 \geq 2$ • Multinomial coeff. $\binom{n}{k_1, \dots, k_t} = \# \text{ways to colour } \{1, \dots, n\}, k_i \text{ of colour } i.$ • $t=2$: binomial

ex. $\binom{4}{1, 2, 1} = 12$

Prop. $\binom{n}{k_1, \dots, k_t} = \frac{n!}{k_1! \dots k_t!}$

Pf.Ex. How many "words" use all letters of SUCCESSOR?Multinomial thm + Pf.ex. • binomial, trinomial• do $(a+b+c)^2 = \dots$ explicitly.Ex. Prove $\sum_{k=0}^n \binom{n}{k} = 2^n$ in two ways.if time [Same with $\sum_{k=0}^n (-1)^k \binom{n}{k} = 0, n \in \mathbb{Z}_+$]