

Pascal's Identity

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

$$\hookrightarrow = \frac{(n+1)!}{k! (n+1-k)!}$$

Binomial Theorem

$$(x+y)^z = \sum_{k=0}^z \binom{z}{k} (x^k y^{z-k})$$

Distributing...

- distributing n items to k cells

Distinguishable objects	Indistinguishable	
n^k	$\binom{n+k-1}{n}$	w/o exclusion
$P(n,k)$	$\binom{n}{k}$	with exclusion (1-obj/cell)

Determining Coefficients Ex's

$$- \text{coeff}(x^4 y^2) = \binom{6}{4} 2^4 (-3)^2 \quad \text{for } (2x-3y)^6$$

$$- \text{coeff}(x^3 y^3) = \binom{6}{3} 2^3 (-3)^3$$

Multisets = order no matter, repeats count

- How Many Multisets are there
of size k from alphabet of
length n ?

$\hookrightarrow n$ objects
choose k -
element
multisets

$$\frac{(k+n-1)!}{k! (n-1)!} = \binom{n+k-1}{k}$$

Other Stuff

- How many ways to select k
objects from n distinct obj's

Order	Unordered	
n^k	$\binom{n+k-1}{k}$	repeats not distinct
$P(n,k)$	$\binom{n}{k} = \frac{n!}{k!(n-k)!}$	repeats = No - dist. no re