$n,k \in \mathbb{N}$, $n \geq k$

$$(a+b)^n = \sum_{k=0}^{n} \left\langle \begin{matrix} n \\ k \end{matrix} \right\rangle a^{n-k} b^k$$

symmetrical combinations series without repetitions

$$\left\langle \begin{matrix} n \\ k \end{matrix} \right\rangle = \frac{n!}{k!\,(n-k)!} = \prod_{h=0}^{k-1} \frac{n-h}{k!}$$

asymmetrical combinations series without repetitions

$$\frac{n!}{(n-k)!} = \prod_{h=0}^{k-1} (n-h)$$

, thence if $n = k$, this generates $n!$.

permutations

symmetrical combinations series with repetitions

$$\left\langle \begin{matrix} n+k-1 \\ k \end{matrix} \right\rangle = \frac{(n+k-1)!}{k!\,(n-1)!}$$

asymmetrical combinations series with repetitions

$$n^k$$

to be continued ....