1/18

Friday, January 18, 2019 14:22

Permutation $(n)_k = n \cdot (n-1) \cdot (n-2) \cdot \cdots \cdot (n-k+1)$.

if $|A| < |B| < \infty$ then $|\mathrm{inj}(A, B)| = (|B|)_{|A|}$.

Proof: induction. fix $a_0 \in A$. let $\Phi_b = \{ f \in \mathrm{inj}(A,B) : f(a_0) = b \}$.

Then $\bigsqcup_{b \in B} \Phi_b = \mathrm{inj}(A, B)$ so $|\mathrm{inj}(A, B)| = \sum_{b \in B} |\Phi_b|$.

and $f \in \Phi_b \iff f\big|_{A \setminus \{a_0\}} \in \mathrm{inj}(A \setminus \{a_0\}, B \setminus \{b\})$

so $\Phi_b = \mathrm{inj}(A \setminus \{a_0\}, B \setminus \{b\})$.

generalized binomial Theorem

$$\prod_{i=1}^{n} (a_i + b_i) = \sum_{I \subseteq \{1,\dots,n\}} \left(\prod_{i \in I} a_i\right) \left(\prod_{j \in \{1,\dots,n\} \setminus I} b_j\right)$$

Regular binomial thm

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}.$$