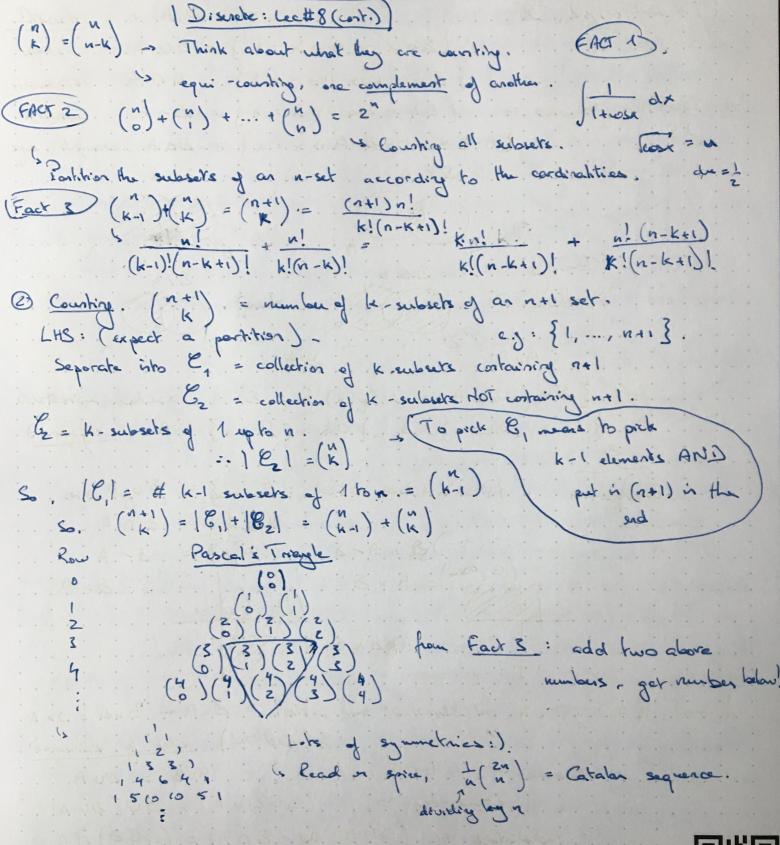
puzzle: prove by viduetion. Motation:  $\frac{n!}{k!(n+k)!} = \binom{n}{k}$  in choose (k=0,1,2,...,n).  $\binom{n}{n} \binom{n}{n} \binom{n}{n} \binom{n}{n} \binom{n}{n} = n$ The number of zero sets = 1 number of n. sets = 1 Proposition: (K) = (N-K) Proof: 1 Algebra. (2) Bijection between { k-sets} -> { h-k sets} a complement -> equi-counting. Count 2 things that are Discrete: Lecture #8 Th: The number of k-subsects of an ambient n-set is k! (n-k).

Notation: (k) = k! (n-k)! , nCk nad k are integers, because they are country something. ( ) Binomial coefficients (0) ×



Discusta: Let & (cont.) This (Bisourist Formula) for each positive riteger in, and variables is and y, we have: n (x+y) = (0)x + (1) x y + (2) x y - (1) xy + (1) y (xty) = \( \( \text{x} \) \( \text{x Proof: (by courting). In times (xxxx...xx) (xxxx...xy. 27 terms of the form xkyn-k - uncollected. Each term x y " appeare by picking x out of k parentheses and y ent of the remaining n-1 parentheses. There are (") ways of picking k parenthuses. (") = bohomial coefficient. Applications: x=1, y=1,  $z^n = \sum_{k=0}^n {n \choose k}$ . x=1, (y+1) = Zik=0(k) yk Industrial - Exclusion

Two sets: |A, UA2 | = |A, |+ |A2 | - |A, |A2 | over-counted Three sale: |H, UAZ UAS = |A, 1+ |Az | + |As - | A, OAZ | - |AZ OAZ | - |H, OAZ | + ( | A, nAzn Az | + ... ) ... And so on!  $= \sum_{k=1}^{n} \sum_{i \in I} (-i)^{k-1} | A_i |$  |II| = k|II|= K 디멀디

our the summation