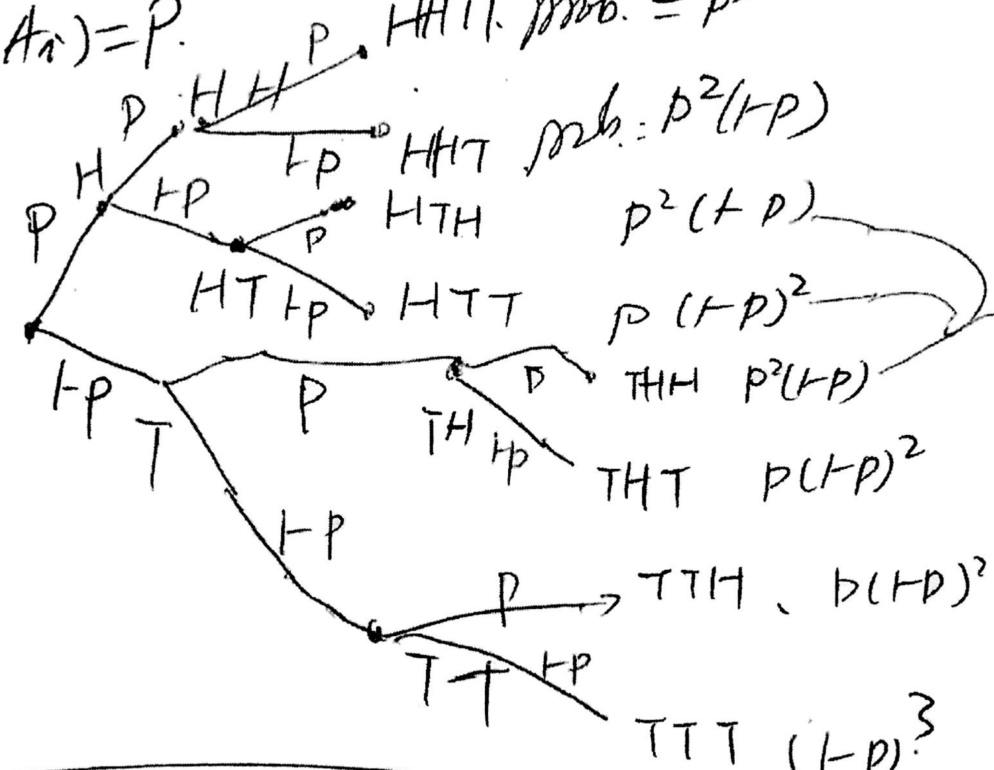
independent Trials and Binomial Probability.

H. T.

n independent toss of a coin.

$A_i = \{ i\text{th Toss is a head} \}$. Bernoulli trial.

$p(A_i) = P$.



probability of n-long sequence k heads $n-k$ T (

$$p^k(1-p)^{n-k}$$

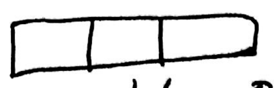
$p(k) = P(k \text{ heads up in } n\text{-toss sequence})$

$$= \binom{n}{k} p^k (1-p)^{n-k}$$

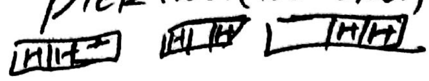
$$C_2^3 = \frac{3!}{2!} = 3$$

one ~~left~~ left for T

$$\sum_{k=0}^{n} \binom{n}{k} p^k (1-p)^{n-k} = 1$$



3 slots, $\nearrow$ H.
pick two. (No order)



Example 27 , number of subsets of n-Element set.

$\emptyset$ 2^n

p-permutation.

1 2 R. (n object)

$n \cdot (n-1) \cdots (n-(k-1)) = \frac{n!}{(n-k)!}$

Examp 28. Four distinct letters. How many words

20 25 24 23. $\frac{26!}{(26-4)!}$

26

Take 4.

Combiation

No order does

2-permutat of A, B, C, D

AB, ~~BA~~, AC, CA, AD, DA, BC, CB, BD, DB, CD, DC.

Combinati

AB, AC, AD BC BD. CD.

$$\frac{n!}{k!\,(n-k)!}$$

$\binom{n}{k}$ ✓.

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partition n. (n elements)

$n = n_1 + n_2 \cdots + n_r$.

n_1 n_2 n_r

$$= \binom{n}{n_1}\binom{n-n_1}{n_2}\binom{n-n_1-n_2}{n_3}\cdots\binom{n-n_1\cdots n_{r-1}}{n_r}$$

$$= \frac{n!}{n_1!\,(n-n_1)!}\cdot\frac{(n-n_1)!}{n_2!\,(n-n_1-n_2)!}\quad\frac{(n-\quad n_{r-1})!}{(n-\cdots n_r)!\,n_r!}$$

$$= \frac{n!}{n_1! \cdots n_r!}$$

Ex 33. 4 ~~gra~~gradut. 12 undrgrade.

4 4 4 4

$$\frac{16!}{4!4!\cdots 4!} \longrightarrow \text{sample space}$$

each group has one gradue.

Two stages:

(a). take fourgrade $\longrightarrow$ 4 3 2 1

$$4!$$

(b) divide 12 unders to 4 group (each 3)

$$\frac{12!}{3!3!3!}$$

$$\frac{4!\,\frac{12!}{3!3!3!3!}}{\frac{16!}{4!4!4!4!}} = \frac{12\cdot 8\cdot 4}{15\cdot 14\cdot 13}$$