$\binom{1}{0}$ bit (John Tukey)

AMS 131, 5 Aug 19

16 bits $\longleftrightarrow$ 2.14e+186

32

64

1

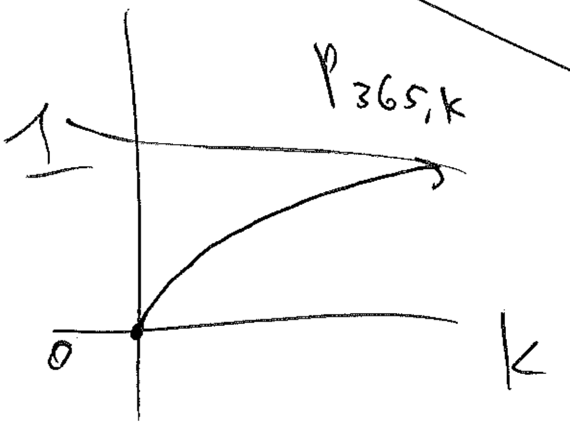
overflow $\to +\infty / -\infty$

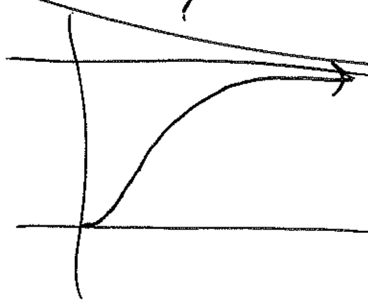
underflow $\to 0$

$p_{n,k}$ $\left[1 - \dfrac{n!}{(n-k)!\, n^k} \right] \uparrow$

45 $k \uparrow$

$p_{365,k}$





$\log(x \cdot y) = \log x + \log y$

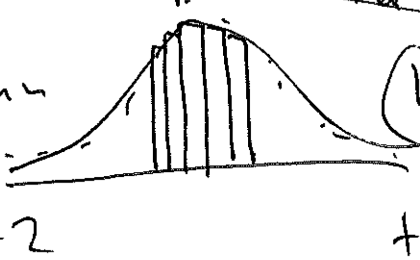
$\log(x + y)$

for any $x > 0$, $x = \exp[\log(x)]$

$$p_{n,k} = 1 - \exp\left[\log \frac{n!}{(n-k)!\, n^k} \right] \quad (9.52)$$

simpson's rule

riemann sums (histogram) e^{-x^2}



TS = 1
NTS = 0
NTS
i j

categorical or qualitative
('TS', 'NTS', 'NTS', 'TS')

type (character
string

structural
says
(quant.)
type int
type num (float) R
binary (discrete)

1
0
0
1

73.21788...
68.0

daily max temp

conceptually
continuous

quantitative
(float)

Metropolis
& Ulam

random
simulation

(1951)

Monte-Carlo
method

(10.52)

casinos

$P(H) = \cancel{\frac{1}{2}}$ undefined without context

$P(H \mid \underbrace{\text{fair coin tossing}}_{(A I J)}) = \frac{1}{2}$

$\boxed{\text{context}}$

$$\begin{pmatrix} y_1 \\ \vdots \\ y_n \end{pmatrix} \updownarrow n$$

(unweighted) mean $\bar{y}_n = \frac{1}{n} \sum_{i=1}^{n} y_i = \sum_{i=1}^{n} \boxed{\left(\frac{1}{n}\right)} y_i$

$= \frac{1}{n}(y_1) + \frac{1}{n}(y_2) + \cdots + \frac{1}{n}(y_n)$

weighted mean $\bar{y}_w = \sum_{i=1}^{n} w_i y_i, \quad 0 \leq w_i \leq 1, \quad \sum_{i=1}^{n} w_i = 1$

weighted average

mixture of $\{P(A \mid B_i)\}$ with mixture weights $P(B_i)$

$P(A) = \sum_{i=1}^{k} P(B_i) \, P(A \mid B_i)$

④

A, B are conditionally independent given C iff $P(A \text{ and } B \mid C) =$

$$P(A \mid C) \cdot P(B \mid C)$$