Formulas, etc.

Combinatorics

$P_r^n = n(n-1)(n-2)\cdots(n-r+1) = \frac{n!}{(n-r)!}$ $\quad$ $C_r^n = \frac{n(n-1)(n-2)\ldots(n-r+1)}{r!} = \binom{n}{r} = \frac{n!}{r!(n-r)!}$

Probability Laws/Rules

$P(B|A) = \frac{P(A|B)P(B)}{P(A)}$

Assume that $\{B_1, \cdots, B_k\}$ is a *partition* of the sample space $\mathcal{S}$ and $P(B_i) > 0 \; \forall \; i$: $P(A) = \sum_{i=1}^{k} P(A|B_i)P(B_i)$

Discrete Probability Distributions

pmf: $p(y)$ $\quad$ cdf: $F(y) = \sum_{z=-\infty}^{y} p(z)$

$0 \leq p(y) \leq 1$; $\sum_{y=-\infty}^{\infty} p(y) = 1$

$P(Y = y) = p(y)$; $P(a \leq Y \leq b) = \sum_{a}^{b} p(y)$