Counting Rules

Permutation \( nP_x = \frac{n!}{(n-x)!} \)

Combination \( nC_x = \binom{n}{x} = \frac{n!}{x!(n-x)!} \)

Elementary Probability Rules

\[
P(A \cup B) = P(A) + P(B) - P(A \cap B) \quad \text{addition rule}
\]

\[
P(A \cap B) = P(A) \cdot P(B|A) \quad \text{dependent}
\]

\[
P(A \cap B) = P(A) \cdot P(B) \quad \text{independent}
\]

\[
P(A|B) = \frac{P(A \cap B)}{P(B)} \quad \text{conditional}
\]

Probability Distribution Rules

Complementary Rule \( P(X > x_i) = 1 - P(X \leq x_i) \)

Success-Failure Rule

\[
f(x = x_i|n, p) = f(x = n-x_i|n, 1-p)
\]

\[
f(x \leq x_i|n, p) = f(x \geq n-x_i|n, 1-p)
\]

\[
f(x \geq x_i|n, p) = f(x \leq n-x_i|n, 1-p)
\]

Symmetry Rule \( P(-a \leq z \leq 0) = P(0 \leq z \leq a) \)

Distribution Functions

Binomial Probability Distribution \( f(x = x_i|n, p) = _n C_x \cdot p^x (1-p)^{n-x} \)

Poisson Probability Distribution \( f(x = x_i|\mu) = \frac{e^{-\mu} \mu^x}{x!} \)

Hypergeometric Probability Distribution \( f(x = x_i|N, N_1, N_2, n) = \frac{N_1 C_x \cdot N_2 C_{n-x}}{N C_n} \)

Normal Transforms

\[
z = \frac{x - \mu}{\sigma}
\]

\[
x = \mu + z \sigma
\]