

Formulas

Probability Rules:

Complements A and A^C : $P(A^C) = 1 - P(A)$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$P(A \text{ and } B) = P(A) * P(B|A) = P(B) * P(A|B)$

A and B are disjoint events i.e. mutually exclusive if $P(A \text{ and } B) = 0$, they cannot occur at the same time.

A and B are independent events if $P(A) = P(A|B)$ or $P(B) = P(B|A)$

Discrete random variable: x

Probability distribution: $0 \leq P(x) \leq 1, \sum P(x) = 1$

Mean: $\mu = \sum xP(x)$

Binomial random variable: x counts the number of successes in n independent trials where the probability of success on any one trial is p

Probability function: $P(x) = \binom{n}{x} p^x (1-p)^{n-x} \quad x = 0, 1, 2, \dots, n$

Mean: $\mu = np$, Standard deviation: $\sigma = \sqrt{np(1-p)}$

Normal random variable, y :

Mean: μ , Standard deviation: σ

Standardize: $z = \frac{y - \mu}{\sigma}$

Distribution of the sample proportion, \hat{p} :

Shape: approximately normal,

Mean: p , Standard deviation: $SD(\hat{p}) = \sqrt{\frac{p(1-p)}{n}}$

Standardize: $z = \frac{\hat{p} - p}{SD(\hat{p})}$

Distribution of the sample mean, \bar{y} :

Shape: approximately normal,

Mean: μ , Standard deviation: $SD(\bar{y}) = \frac{\sigma}{\sqrt{n}}$

Standardize: $z = \frac{\bar{y} - \mu}{SD(\bar{y})}$