Conditional probability and Bayes' Rule

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

$$P(M|D) = \frac{P(D|M) \cdot P(M)}{\sum_{i=1}^{k} P(D|M_i) \cdot P(M_i)}$$

Conversions:

$$\text{p} = \frac{\text{odds}}{1+\text{odds}}$$

$$\text{odds} = \frac{\text{p}}{1-\text{p}}$$

$$Z = \frac{X-\mu}{\sigma}$$

$$X = \mu + \sigma \cdot Z$$

Single Normal Sample

μ_{box} is approx $t(df)$ with

$$df = n-1$$

$$\mu = \bar{x}$$

$$\sigma = sem = \frac{s}{\sqrt{n}}$$

Two Normal Samples

$\Delta = \mu_2 - \mu_1$ is approx $t(df)$ with

$$\mu = \hat{\Delta} = \bar{x}_2 - \bar{x}_1$$

$$\sigma = sed = \sqrt{sem_1^2 + sem_2^2}$$

$$df = \frac{sed^4}{\frac{\left(sem_1^4\right)}{df_1} + \frac{\left(sem_2^4\right)}{df_2}}$$

Single Bernoulli Rate

$$\mu = \hat{\text{p}} = \frac{x}{n}, \; x = successes, \; n = trials$$

$$\sigma = sep = \sqrt{\frac{\hat{\text{p}} \cdot (1\text{-}\hat{\text{p}})}{\text{n}}}$$

Two Bernoulli Rates

$$\mu = \hat{\Delta} = \hat{\text{p}}_2 - \hat{\text{p}}_1$$

$$\sigma = sed = \sqrt{sep_1^2 + sep_2^2}$$

Relative Risk

$\ln(RR)$ is approximately normal with

$$\mu = \ln\left(\widehat{RR}\right)$$

$$\sigma = \frac{\ln\left(\frac{UCL}{LCL}\right)}{2 \cdot 1.96}$$

Odds Ratio

$\ln(OR)$ is approximately normal with

$$\mu = \ln\left(\widehat{OR}\right)$$

$$\sigma = \frac{\ln\left(\frac{UCL}{LCL}\right)}{2 \cdot 1.96}$$

Multiple Linear Regression

$$\hat{y} = \beta_1 \cdot x_1 + \cdots + \beta_k \cdot x_k$$

β_i is approximately $t(df)$ with

$$\mu = \hat{\beta}_i$$

$$\sigma = seb$$

Logistic Regression

$$\ln\left(\widehat{odds}\right) = \beta_1 \cdot x_1 + \cdots + \beta_k \cdot x_k$$

β_i is approximately *normal* with

$$\mu = \hat{\beta}_i$$

$$\sigma = seb$$

Adjusted OR = $\exp\left(\beta_i \cdot \Delta X_i\right)$

Kaplan-Meier:

Interval	at Risk	Failed	Censored	Failure Rate	Survival Rate
previous	A	F	C	R = F/A	S
next	a=A – F – C	f	c	r = f/a	S·(1 – r)

Decision Analysis by Backward Induction:

Working right to left:

Replace each stochastic node with its expected value.

Replace each decision node with the cost of the lowest cost decision.