

1 Chapter 1—Introduction

- Categorical data
- Response and explanatory variables
- Nominal and ordinal data
- Models for categorical data
 1. Binomial distribution
 2. Poisson distribution
 3. Multinomial distribution
 4. Negative binomial distribution
- Inference for the binomial probability
 - Confidence intervals
 - Hypothesis tests
- Inference for the Poisson mean
- Testing goodness of fit for the multinomial distribution
 - Completely specified cell probabilities
 - Cell probabilities depending on unknown parameter

2 Chapter 2—Contingency Tables

- Probability structure of contingency tables
- Independence

- Binomial, Poisson, and multinomial sampling
- Inference concerning $\pi_1 - \pi_2$
- Relative risk
- Odds ratio, inference for odds ratio and log odds ratio
- Types of study
 - Prospective and retrospective studies
 - Cohort study, clinical trial, case-control study, cross-sectional study
 - Observational and experimental studies
- Chi-squared tests of independence
 - Pearson's chi-squared statistic
 - Likelihood ratio statistic
 - Other tests: Continuity adjusted χ^2 test, Mantel-Haenszel χ^2 test
- Fisher's exact test
- Extensions to $I \times J$ tables
 - Odds ratios in $I \times J$ tables
 - Testing independence
 - Partitioning chi-squared
 - Residuals
 - Mosaic plots
- Testing independence for ordinal data

- Review of linear correlation
- Rank correlation: Spearman's ρ and Kendall's τ
- Test for nonzero correlation using M^2
- Choice of scores
- Three-way contingency tables
 - Stratified analysis
 - Partial association
 - Multivariate categorical data: (X, Y, Z)
 - Partial tables
 - Marginal (X, Y) table
 - Conditional and marginal independence and association
 - Conditional and marginal odds ratios
 - Simpson's paradox
 - Homogeneous association
- Cochran-Mantel-Haenszel Methods
 - CMH test for conditional independence
 - Estimation of a common odds ratio
 - * Mantel-Haenszel estimator
 - * Logit estimator
 - Testing homogeneity of the odds ratio using the Breslow-Day test

Chapter 3—Generalized Linear Models

- Components of a generalized linear model
 - Random component
 - Linear predictor
 - Link function
- Generalized linear models for binary data
 - Linear probability model
 - Logistic regression model
 - Probit regression model
- Generalized linear models for count data
 - Poisson regression with log link
 - Poisson regression for rate data
 - Negative binomial regression with log link
- Inference for GLMs
 - Likelihood function
 - Maximum likelihood estimation and properties of MLEs
 - Confidence intervals
 - Likelihood approaches to testing
 - * Wald test, score test, likelihood ratio test
 - Deviance
 - Using deviance to form LR statistic for nested models

- Model choice using AIC , AIC_C , and BIC
- Analyzing a Poisson regression model with log link
 - Interpreting computer output
 - Inference for Poisson regression
 - Poisson regression for rate data using an offset term
 - Checking the fit of a Poisson regression model
 - Overdispersion in Poisson regression
 - Negative binomial regression model