

Contents

1	Single Proportion	1
1.1	Distribution Theory	1
1.2	Inverse Sampling	4
1.3	Application to Capture-Recapture	5
1.4	Inference for a Proportion	6
	References	8
2	Single Probability	9
2.1	Binomial Distribution	9
2.1.1	Estimation	9
2.1.2	Likelihood-Ratio Test	10
2.1.3	Some Properties of the Binomial Distribution	10
2.1.4	Poisson Approximation	12
2.2	Inverse Sampling	12
2.3	Inference for a Probability	13
2.3.1	Exact Intervals	13
2.3.2	Exact Hypothesis Test	14
2.3.3	Approximate Confidence Intervals	15
	References	17
3	Several Proportions or Probabilities	19
3.1	Multi-Hypergeometric Distribution	19
3.2	Comparing Two Proportions from the Same Population	20
3.2.1	Nonoverlapping Proportions	20
3.2.2	Dependent Proportions	21
3.2.3	Two Independent Proportions	23
3.3	Comparing Two Probabilities from Independent Binomial Distributions	23
3.3.1	Difference of Two Probabilities	23
3.3.2	Relative Risk	26
3.3.3	Odds Ratio	27

3.4	Multinomial Distribution	28
3.4.1	Maximum Likelihood Estimation	28
3.4.2	Comparing Two Probabilities from the Same Population	30
3.5	Asymptotic Multivariate Normality	30
3.5.1	Simultaneous Confidence Intervals	32
3.5.2	Bonferroni Confidence Intervals	34
3.6	Animal Population Applications	34
3.6.1	Random Distribution of Animals	34
3.6.2	Multiple-Recapture Methods.	35
3.7	Appendix: Delta Method	37
3.7.1	General Theory.	37
3.7.2	Application to the Multinomial Distribution	38
3.7.3	Asymptotic Normality	39
	References	39
4	Multivariate Hypothesis Tests.	41
4.1	Multinomial Test Statistics	41
4.1.1	Likelihood-Ratio Test for $p = p_0$	41
4.1.2	Wald Test	42
4.1.3	Score Test	43
4.1.4	Deviance	44
4.2	A More General Hypothesis	44
4.2.1	Freedom Equation Specification of H_0	45
4.2.2	General Likelihood-Ratio Test	45
4.3	Contingency Tables	46
4.3.1	Test for Independence in a Two-Way Table.	47
4.3.2	Several Multinomial Distributions.	49
4.4	2×2 Contingency Tables	50
4.4.1	Examples	50
4.4.2	Chi-Square Test	51
4.4.3	Fisher's Exact Test	53
4.4.4	Correlated Data.	54
	References	56
5	Logarithmic Models.	59
5.1	Log-Linear Models	59
5.1.1	Contingency Tables.	59
5.1.2	Test Statistics.	61
5.1.3	Application of Log Linear Models to Epidemiology	62
5.2	Logistic Models.	64
5.2.1	Independent Binomial Distributions.	65
5.2.2	Logistic Multinomial Regression Model.	67
	References	69