

Contents

Chapter 1 – Introductory probability: random variables and their properties	5
1.1. Discrete random variables	5
1.2. Continuous random variables	11
Chapter 2 – Main discrete and continuous distributions, their properties and parameters	17
2.1. Binomial distribution	17
2.2. Poisson distribution	19
2.3. (Continuous) Uniform distribution	21
2.4. Exponential distribution	22
2.5. Normal (Gaussian) distribution	23
Chapter 3 – Applications of basic distributions. Simple simulation with Excel spreadsheet.	29
3.1. Important statistical functions of Excel	29
3.2. Basic simulation with Excel.	34
Chapter 4 – Sampling distributions	43
4.1. Distribution of mean	44
4.2. Distribution of variance.	48
4.3. The Student's t-distribution	52
4.4. F-Snedecor distribution	57
Chapter 5 – Point Estimation	61
5.1. Properties of estimators	61
5.2. Methods of estimation.	67
Chapter 6 – Estimation and distribution fitting with spreadsheet.	79
6.1. ML estimation with Solver	80
6.2. Selecting the right distribution	85

Chapter 7 – Confidence intervals and their applications	91
7.1. Typical confidence intervals	91
7.2. Asymptotic confidence intervals	101
7.3. Applications of confidence intervals	103
Chapter 8 – Hypothesis Testing	109
8.1. Introduction to general theory of hypothesis testing.	109
8.2. Likelihood Ratio Test	114
Chapter 9 – Typical parametric tests and their applications	121
9.1. Test for mean value in the normal population with known standard deviation. . .	121
9.2. Further parametric tests.	127
Appendix: Statistical tables, spreadsheet and their use in search of critical values . .	139
References	149