Contents

Polish Probabilists **1**

Prologue and Logistics – per se **3**

Dice Players **5**

BOOK ONE THEORY

Chapter 1: Descriptive Statistics **9**

1.1 A Dialogue 9
1.2 Defining the Subject 11
1.3 Descriptive Statistics Dimension One 13
1.3.1 Mean Value – Definition and Significance 13
1.3.2 Variance, and Variability 16
1.3.3 Linear Transformations 19
1.3.4 Z-Score Statistics 25
1.4 Famous and Admired 26
Literature References 35

Chapter 2: Grouped Data. Introduction to General Statistics **37**

2.1 Grouping Due to Attributes 38
2.2 Inner Appendix 45
2.3 Grouping of Variables 50
2.4 Direct Method to Derive Averages 53
2.5 Coded Method 56
2.6 Discussing Two Special Cases 58
2.7 Percentiles for the Grouped Data 62
References 64

Chapter 3: Regression vrs. Correlation **67**

3.1 Linear Regression – The Idea 67
3.2 Regression Lines 69
3.3 Arithmetical Appendix without Comments 75
3.4 Correlation – Descriptive Statistics 76
3.5 Correlation – Grouped Data 80
3.6 The Great Table of Correlation 80
References 85

Chapter 4: Binomial Distribution **87**

4.1 Tracing the Origin 87
Abuthnot 88
Pascal 90
Stifel 93
Bayes 96
4.2 Close Acquaintance 99
4.3 Three Problems of S. Pepys [22], p.400-401 99
4.4 Weldon's Dice Data 102
4.5 Two Shores – Two Tails 103
4.6 Jacob Bernoulli' Weak Law of Large Numbers 109
4.7 Following Abraham de Moivre 110
4.8 Beyond the Binomial Distribution 113
4.9 Derivation of the Poisson Distribution 116
4.10 Notes on the Multinomial and Negative Binomial Distributions 121
References 125

Chapter 5: Normal Distribution Binomial Heritage **129**

5.1 Normal Statistics, Preliminaries 129
5.2 Four Properties of the Normal Distribution 135
5.3 Making Use of the Statistical Tables of the Normal Distribution 135
5.4 Two Proofs 137
5.5 The Central Limit Theorem – An Intuitive Approach 138
5.6 Distribution of Sample Means 140
5.7 Properties of the Distribution of Sample Means 141
5.8 To Initiate the Monte Carlo Simulation 144
5.9 De Moivre–Laplace Limit Theorems 149
5.10 Remarks on the Binomials Convergence 154
References 157

Les Gross Poissons **159**

BOOK TWO EXERCISES

Unit 1: Descriptive Statistics **165**

Problem 1.1 (see: [1], Prob. 4.10, p.59) 165
Problem 1.2 (see: [1], Prob. 2.8, p.23) 165
Problem 1.3 (see [1], Prob. 2.20, p.25) 166
Problem 1.4 168
Problem 1.5 (Follows Prob.4.25 [1]) 170
Problem 1.6 (see [1], Prob.2.29) 174
Problem 1.7 (see [1], Prob.2.26) 175
Problem 1.8 (see: [1], Prob.2.23) 176
Problem 1.9 (see [1], Prob.3.9) 177
Short Note 178

Problem 1.10 (see: [1], Prob.3.7) 179
Problem 1.11 (see: [1], Prob.3.21) 180
Problem 1.12 (see: [1], Prob.3.13, p.42) 180
Problem 1.13 (see [1], 3.28, p.45) 181
Problem 1.14 (see [6], 2.21) 181
Problem 1.15 (see: [1], Prob.3.27) 185
References 187

Unit 2: Grouped Data 189

Problem 2.1 (see [1], p.15) 189
Problem 2.2 (see [1], p.16) 190
Problem 2.3 (see: [1]), p.16) 191
Problem 2.4 (see [2], Prob.5.12) - The Continuous Case 192
Problem 2.5 (see [2], Prob.5.10) – The Discrete Case 194
Problem 2.6 (see: [4], pp.32-33) 196
Problem 2.7 199
Problem 2.8 (see [2], Prob.5.21) 205
Problem 2.9 (see [2], Review I, Prob.1.13) 206
Problem 2.10 (see [1], p.96) 208
Problem 2.11 (Example of the Final Examination Problem) 211
Problem 2.12 (see [1], p.104) 213
Problem 2.13 (Another Example of the Final Examination Problem) 213
References 215

Unit 3: Regression vs. Correlation 217

Problem 3.1 (see [3]) 217
Problem 3.2 221
Problem 3.3 [6] 223
Problem 3.4 226
Problem 3.5 226
Problem 3.6 226
Problem 3.7 227
Problem 3.8 228
Problem 3.9 231
Problem 3.10 235
Problem.3.11 (see [4], Problem.16.11) 237
Problem 3.12 238
Problem Extra One 241
References 242

Unit 4: Binomial Distribution 245

Problem 4.1 (see [12], Problem 3.1, p.256, p.453) 245
Problem 4.2 (see [12], Problem 2.12, p.251) 248
Problem 4.3 249
Problem 4.4 252

Problem 4.5 252
Problem 4.6 253
Problem 4.7 (see: [13], p.125) 256
Problem 4.8 259
Problem 4.9 261
Problem 4.10 (see [2], Problem 9.15, p.178) 262
Problem 4.11 (see [13], p.128) 263
Problem 4.12 (see [5], p.165, p.63) 264
Problem 4.13 (Source: Internet) 265
Problem 4.14 266
Problem 4.15 (see [14]) 268
Problem 4.16 (see [19]) 270
Problem 4.17 272
References 273

Unit 5: Normal Distribution. Binomial Heritage 275

Problem.5.1 (see [5], Problem 7.16, p.129) 276
Problem 5.2 (see [5], Problem 7.20) 276
Problem 5.3 (see 7.22 in [5], Modified) 279
Problem 5.4 ([1], 7.28 – No Answer) 280
Problem 5.5 ([1], 7.27 – Answers Enclosed) 281
Problem 5.6 ([1], 7.29, with a Single Answer; Modified) 282
Problem 5.7 (Following Problem 4.5) 283
Problem 5.8 (Following Problem 4.7) 285
Problem 5.9 (Following Problem 4.8) 285
Problem 5.10 (Following Problem 4.10) 286
Problem 5.11 (see [5], Problem 7.25) 286
Problem 5.12 (Weinberg [1] 10.5 p. 196) 288
Problem 5.13 Weinberg [1], 10.7, p.196) 289
Problem 5.14 (Weinberg [1], 10.9, s.196) 291
Problem 5.15 (Weinberg [1], 10.13, p.197) 293
Problem 5.16 (Weinberg [1], 10.15, p.197) 295
Problem 5.17 (Weinberg [1] 10.23, p.198) 297
Problem 5.18 (Weinberg [1], 8.8, p.157, No Answers) 298
Problem 5.19 (Weinberg [1], 8.10, p.157 – No Answers) 300
Problem 5.20 301
References 302

Error Function 303

References 305

Index 311