

Cambridge University Press
978-1-316-60700-8 - A First Course in Statistics
Robert Loveday
Frontmatter
[More information](#)

A
FIRST COURSE IN
STATISTICS

Cambridge University Press
978-1-316-60700-8 - A First Course in Statistics
Robert Loveday
Frontmatter
[More information](#)

Cambridge University Press
978-1-316-60700-8 - A First Course in Statistics
Robert Loveday
Frontmatter
[More information](#)

A
FIRST COURSE IN
STATISTICS

BY

ROBERT LOVEDAY

M.Sc., F.I.S.

*Principal Lecturer in Mathematics and Statistics,
The Technical College,
Kingston-upon-Thames*



CAMBRIDGE
AT THE UNIVERSITY PRESS
1964

Cambridge University Press
978-1-316-60700-8 - A First Course in Statistics
Robert Loveday
Frontmatter
[More information](#)

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781316607008

© Cambridge University Press 1964

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First edition 1958

Reprinted 1960, 1961, 1964

First paperback edition 2016

A catalogue record for this publication is available from the British Library

ISBN 978-1-316-60700-8 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Contents

Preface *page xi*

CHAPTER 1. FREQUENCY DISTRIBUTIONS

1. The formation of a frequency distribution	1
2. The histogram	1
3. The mode	1
4. A frequency distribution by grouping	2
5. Modal class	2
6. Discrete and continuous variation	2
7. The frequency polygon	3
8. Example	3
9. Experiments with dice	5
10. Throwing three dice: normal distributions	5
11. Throwing six dice: skewed distributions	5
12. Throwing one die: rectangular distributions	7
13. EXERCISES	7
14. Determination of the mode	10
15. EXERCISES	11
16. Frequency distribution with unequal class intervals	11
17. Comments on special features of the histogram	13
18. EXERCISES	14

CHAPTER 2. CUMULATIVE FREQUENCY DISTRIBUTIONS

19. The cumulative frequency distribution	15
20. The cumulative frequency curve or ogive	15
21. Correct wording and correct plotting	16
22. Percentiles	17

CONTENTS

23. The median	<i>page</i> 18
24. The median of a large population	18
25. The quartiles	19
26. EXERCISES	19
CHAPTER 3. AVERAGES	
27. The arithmetic mean of a set of numbers	23
28. EXERCISES	24
29. When some of the observations are repeated	24
30. The mean of a frequency distribution	24
31. EXERCISES	25
32. The use of mid-interval values	25
33. The use of Σ	26
34. A second example using mid-interval values	26
35. EXERCISES	27
36. Unequal grouping	28
37. Discussion of averages in general	28
38. The arithmetic mean	29
39. The median	29
40. The mode	29
41. Relation between mean, median and mode	30
*42. The geometric mean	30
*43. The harmonic mean	30
44. EXERCISES	31
CHAPTER 4. DISPERSION	
45. Dispersion or variability	32
46. Examples	32
47. The range	34
48. Interpercentile ranges	35
49. The semi-interquartile range or quartile deviation	35
50. The mean deviation	36
51. EXERCISES	37
52. Mean deviation of a frequency distribution	38

CONTENTS

53. EXERCISES	<i>page</i> 38
54. The standard deviation	38
55. Avoiding the decimals	39
56. Using an arbitrary origin	40
*57. Mathematical justification of the method	41
58. EXERCISES	42
59. The standard deviation of a frequency distribution	42
60. A comparison of the various measures of dispersion	42
*61. The variance	43
*62. The coefficient of variation	44
63. EXERCISES	45
CHAPTER 5. REGRESSION	
64. A bivariate distribution	46
65. The scatter diagram: direct correlation	46
66. Inverse correlation	48
67. Absence of correlation	49
68. The regression line and the regression coefficient	49
69. Method of fitting the regression line	50
70. The two regression lines for more widely scattered points	50
71. To draw the line of regression of x on y	51
72. The line of regression of y on x	52
73. Conclusion	52
74. EXERCISES	52
CHAPTER 6. CORRELATION BY PRODUCT-MOMENTS	
75. The coefficient of correlation	56
76. Calculation of the coefficient of correlation	56
77. The example of inverse correlation	56
78. Terminology	57
79. Table of minimum values of r_{xy}	58
80. EXERCISES	59

CONTENTS

CHAPTER 7. CORRELATION BY RANKS

81. The coefficient of rank correlation	<i>page</i> 62
82. The formula for the coefficient of rank correlation	62
83. Method of ranking equal values of the variate	63
84. EXERCISES	64

CHAPTER 8. THE ANALYSIS OF A TIME-SERIES

85. The graph of a time-series or histogram	66
86. The four-quarterly moving averages	66
87. A convenient method of calculating the moving averages	66
88. EXERCISES	68
89. The twelve-monthly moving average	69
90. The seven-day moving average	70
91. The ten-yearly moving average	70
92. Summary of the analysis of a time-series	74
93. EXERCISES	75

CHAPTER 9. WEIGHTED AVERAGES

94. Percentage relatives	78
95. Weighted average	78
96. The arithmetical calculation of a weighted average	79
97. Index numbers	79
98. The choice of base	80
99. The index of retail prices	81
100. The crude and standardized death-rates	82
101. EXERCISES	84

CHAPTER 10. MISCELLANEOUS TOPICS

102. Diagrammatic representation of statistical data	86
103. The picturegram or pictogram	86
104. Bar diagrams	87
105. Circular diagrams	87
106. EXERCISES	90
107. Sampling	92

CONTENTS

108. Bias	<i>page</i> 92
109. Random sampling	93
110. Quota sampling	94
111. The framing of questions and questionnaires	95
CHAPTER 11. MISCELLANEOUS PROBLEMS	
ANSWERS TO EXERCISES	104
GLOSSARY OF TERMS USED IN THIS WORK	106
INDEX	109
TABLES	
Logarithms	112
Antilogarithms	114
Squares	116
Square roots	118

Cambridge University Press
978-1-316-60700-8 - A First Course in Statistics
Robert Loveday
Frontmatter
[More information](#)

Preface

The title chosen for this book might have been ‘Stage A Statistics’, since, like Stage A Geometry, it is numerical, experimental and practical. It is designed not only to meet the requirements of students preparing for Statistics as an Ordinary Level subject of the G.C.E., but also to give a useful and interesting course of study to boys and girls in Technical Schools. It may also prove helpful to students in Teachers’ Training Colleges and to students of Medicine, Dentistry, Agriculture, Economics or Engineering who require an elementary introduction to the subject before embarking upon a more mathematical treatment. It contains many examples and exercises, mainly taken from the past examination papers of the Cambridge Local Examinations Syndicate, the London University G.C.E. and the Northern Universities’ Joint Matriculation Board. The source of each is shown, and the author’s thanks are due for permission to reproduce them. Use has also been made of data taken from *The Annual Abstract of Statistics* and *The Monthly Digest of Statistics* published by H.M. Stationary Office.

Five more difficult sections and exercises, marked with an asterisk, may be omitted on a first reading (42, 43, 57, 61, 62).

‘A Second Course in Statistics’, will follow. This will be an Advanced and Scholarship Level treatment of the subject. It will introduce probability, the binomial distribution, the normal distribution, significance and confidence limits. It will deal also with regression by the ‘least squares line of best fit’ and give a full treatment of the product-moment correlation coefficient and its significance.

A First Course in Statistics is dedicated to all those boys and girls who have worked under my guidance during the past twenty years. Their difficulties have shown me which points it is necessary to labour, and how far to take the subject.

R. L.

1 January 1958