

LADY LUCK The Theory of Probability Warren Weaver





More about Penguins and Pelicans

Penguinews, which appears every month, contains details of all the new books issued by Penguins as they are published. From time to time it is supplemented by Penguins in Print, which is our complete list of almost 5,000 titles.

A specimen copy of *Penguinews* will be sent to you free on request. Please write to Dept EP, Penguin Books Ltd, Harmondsworth, Middlesex, for your copy.

In the U.S.A.: For a complete list of books available from Penguins in the United States write to Dept CS, Penguin Books, 625 Madison Avenue, New York, New York 10022.

In Canada: For a complete list of books available from Penguins in Canada write to Penguin Books Canada Ltd, 2801 John Street, Markham, Ontario L3R 1B4.

Prelude to Mathematics

W. W. Sawyer

In Mathematician's Delight, one of the most popular Pelicans so far published, W. W. Sawyer describes the traditional mathematics of the engineer and scientist. In Prelude to Mathematics the emphasis is not on those branches of mathematics which have great practical utility, but on those which are exciting in themselves: mathematics which is strange, novel, apparently impossible, for instance, an arithmetic in which no number is bigger than four. These topics are preceded by an analysis of that enviable attribute 'the mathematical mind'. Professor Sawyer not only shows what mathematicians get out of mathematics, but also what they are trying to do, how mathematics grows, and why there are new mathematical discoveries still to be made. His aim is to give an all-round picture of his subject, and he therefore begins by describing the relationship between pleasure-giving mathematics and that which is the servant of technical and social advance.

Mathematical Puzzles and Diversions

Martin Gardner

Whether you are intrigued, embarrassed, or just plain scared by the complexities of mathematics, this is a book which will both delight and infuriate you. Culled from the pages of *Scientific American*, these puzzles, problems, and paradoxes, with names like Hexaflexagons, Polyominoes, and the Icosian Game, are the work of a master and the best of their kind. But a word of warning. This beguiling collection has been specially designed to seduce you for hours, days, weeks, from the duller business of practical life. Be on your guard!

'This book is a "must" for the school and college library and will worthily find a place on the shelves of mathematical teachers' – *Technical Education*

More Mathematical Puzzles and Diversions

Martin Gardner

More Mathematical Puzzles and Diversions is a second collection of compulsive posers from the Scientific American. From Diophantine brain-teasers to diabolic squares, these arithmetical, geometrical, logical, topological, mechanical, and probability problems are designed to beguile the weary leisure-hours and sharpen blunted wits. Like the Generalized Ham Sandwich Theorem and the classic puzzle of the five men, the monkey, and the coconut tree, they not only mystify and amuse but at the same time illustrate important aspects of mathematical thought.

'Anyone who has enjoyed Martin Gardner's first book . . . will want to buy this one. Those who are not familiar with the earlier book are strongly urged to get both' – *The Times Educational Supplement*

Mathematician's Delight

W. W. Sawyer

This volume is designed to convince the general reader that mathematics is not a forbidding science but an attractive mental exercise. Its success in this intention is confirmed by some of the reviews it received on its first appearance:

'It may be recommended with confidence for the light it throws upon the discovery and application of many common mathematical operations' – *The Times Literary Supplement*

'It jumps to life from the start, and sets the reader off with his mind working intelligently and with interest. It relates mathematics to life and thought and points out the value of the practical approach by reminding us that the Pyramids were built on Euclid's principles three thousand years before Euclid thought of them' – John O'London's

'The writer clearly not only loves his subject but has unusual gifts as a teacher ... from start to finish the reader, whose own interests and training may lie in very different fields, can follow the thread' – *Financial News*

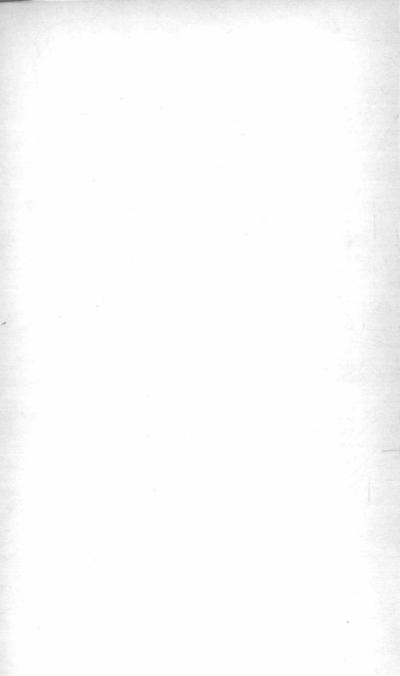


LADY LUCK

Warren Weaver was born in 1894. An internationally famous

mathematican, author and administrator, he was Vice-President of the Alfred P. Sloan Foundation until 1964, when he resigned, although he is still a consultant on scientific affairs. He went to the University of Wisconsin and first taught mathematics at Throop College (now the California Institute of Technology). In 1920 he joined the mathematics department at the University of Wisconsin, where he was made chairman of the department in 1928. He became director for the natural sciences at the Rockefeller Foundation until 1932 and remained with this organization until 1959. holding many posts.

During the Second World War, Warren Weaver worked on a scientific mission to investigate Britain's weapon development, and for this work received many decorations. He served for a time as the Chairman of the Board of Trustees of the Salk Institute, and is a founding member of the Connecticut Academy of Science and Engineering. As an administrator of some of the leading research institutes in the United States, Warren Weaver has been actively and centrally involved with almost every major area of scientific endeavour. Among his many publications are Mathematical Theory of Communication (1949; with Claude E. Shannon). Alice in Many Tongues (1964) and Change of Scene (autobiography; 1970). He was also editor of The Scientists Speak (1947). Warren Weaver now lives with his wife in New Milford, Connecticut.



00,6700 外色病

Warren Weaver

LADY LUCK

The Theory of Probability





PENGUIN BOOKS

Penguin Books Ltd, Harmondsworth, Middlesex, England Penguin Books, 625 Madison Avenue, New York, New York 10022, U.S.A. Penguin Books Australia Ltd, Ringwood, Victoria, Australia Penguin Books Canada Ltd, 41 Steelcase Road West, Markham, Ontario, Canada Penguin Books (N.Z.) Ltd, 182–190 Wairau Road, Auckland 10, New Zealand

First published in the U.S.A. 1963

Published in Great Britain by Heinemann Educational Books 1964

Published in Pelican Books 1977

Copyright © Educational Testing Services Incorporated, 1963

Several illustrations, redrawn, are reproduced with permission from the following: Figure 2 – John Riordan, An Introduction to Combinatorial Analysis (John Wiley, 1958); Figure 3 – J. G. Kemeny et al., Introduction to Finite Mathematics (Prentice-Hall, 1957); Figures 14, 16, 19, 24 – F. Mosteller et al., Probability and Statistics (Addison-Wesley, 1961)

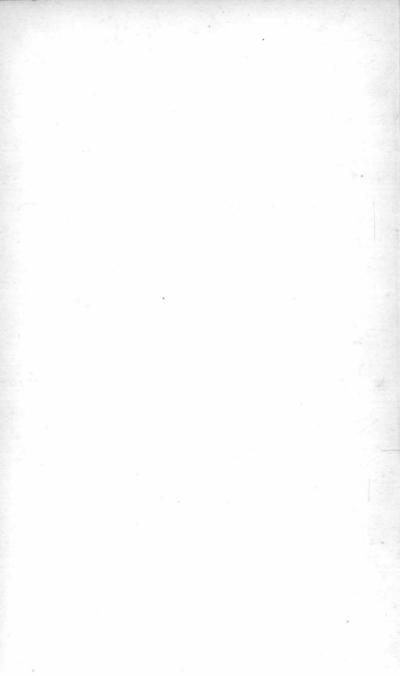
Made and printed in Great Britain by Richard Clay (The Chaucer Press) Ltd, Bungay, Suffolk Set in Monotype Times

Except in the United States of America, this book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form of binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser

She doesn't like mathematics, but she is awfully good at probabilities.

So this is for Mary

此为试读,需要完整PDF请访问: www.erton

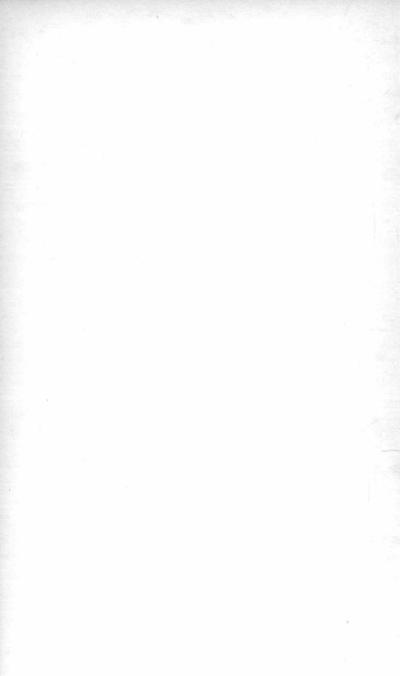


Contents

	Foreword	13
1	Thoughts about Thinking The reasoning animal – Reasoning and fun – The kind of questions we have to answer – What kind of reasoning is able to furnish useful replies to questions of this sort? – Thinking and reasoning – Classical logic	15
2	The Birth of Lady Luck	30
3	The Concept of Mathematical Probability Don't expect too much – Mathematical theories and the real world of events – Mathematical models – Can there be laws for chance? – The rolling of a pair of dice – The number of outcomes – Equally probable outcomes – Ways of designing models – The definition of mathematical probability – A recapitulation and a look ahead – Note on terminology – Note on other books about probability	37
4	The Counting of Cases Preliminary – Compound events – Permutations – Combinations – More complicated cases	59
5	Some Basic Probability Rules A preliminary warning – Independent events and mutually exclusive events – Converse events – Fundamental formulae for total and for compound probability	74
6	Some Problems Foreword – The first problem of de Méré – The problem of the three chests – A few classical problems – The birthday problem – Montmort's problem – Try these yourself – Note about decimal expansions	83

7	Mathematical Expectation	110
	How can I measure my hopes? – Mathematical expectation – The jar with 100 balls – The one-armed bandit – The Nicolas Bernoulli problem – The St Petersburg paradox – Summary remarks about mathematical expectation – Try these – Where do we eat?	
8	The Law of Averages The long run – Heads or tails	131
9	Variability and Chebychev's Theorem Variability - Chebychev's theorem	138
10	Binomial Experiments Binomial experiments – Why 'binomial'? – Pascal's arithmetic triangle – Binomial probability theorem – Some characteristics of binomial experiments	150
11	The Law of Large Numbers Bernoulli's theorem – Comments about the classical law of large numbers – Improved central limit theorems – Note on large numbers	167
12	Distribution Functions and Probabilities Probability distributions – Normalized charts – The normal or Gaussian distribution – What is normally distributed? – The Quincunx – Other probability distributions, the Poisson distribution – The distribution of first significant digits	179
13	Rare Events, Coincidences, and Surprising Occurrences Well, what do you think about that! – Small probabilities – Note on the probability of dealing any specified hand of thirteen cards – Further note on rare events	211
14	Probability and Statistics Statistics – Deduction and induction – Sampling – What sort of answers can statistics furnish? – The variation of random samples – Questions 2 and 3: statistical inference – Question 4: experimental design	230

15	Probability and Gambling	245
	The game of craps – The ruin of the player – Roulette, lotteries, bingo, and the like – Gambling systems	
16	Lady Luck Becomes a Lady	264
	Preliminary – The probability of an event – Geometrical probabilities – It can't be chance! – The surprising stability of statistical results – The subtlety of probabilistic reasoning – The modern reign of probability – Lady Luck and the future	
	Answers	286
	Index	287



The real trouble with this world of ours is not that it is an unreasonable world, nor even that it is a reasonable one. The commonest kind of trouble is that it is nearly reasonable, but not quite.

G. K. CHESTERTON, 'Orthodoxy'

此为试读,需要完整PDF请访问: www.erton