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Exploring mathematics. Investigations with functions.
Burlington, MA: Jones & Bartlett Learning (ISBN 978-1-4496-8854-7/pbk). xxi, 656 p. (2015).

What should be taught in a one- or two-semester course in mathematics for college students majoring in education, languages, music, art, philosophy, or any discipline in humanities or liberal arts? How to demonstrate the utility of mathematical thinking in various areas of society to those students, and how to illustrate the many aesthetic features of mathematics to rouse both their attention and their interest in such a course? The book under review is a very successful attempt to meet these pedagogically demanding challenges. The author's unique strategy is to give a versatile sampling of mathematical topics in the form of explorations of concrete applications, with the concept of function serving as the central unifying aspect. The general approach is rather informal and utmost student-friendly, thereby focussing on an abundance of examples from the humanities as the basic educational tool. As for the precise contents, the book comprises ten chapters, each of which comes with several sections. Chapter 1 develops the concept of function via accustomed examples, concluding with the interpretation of graphs of functions of one real variable. Chapter 2 showcases the use of functions in personal finance matters by discussing interests and effective yields, annuities, and ammortization of loans. Chapter 3 illuminates concepts from logic and computer science, with statements and connectives, truth and consequences, tautologies and syllogisms, and computer programming structures being main themes of discussion. Chapter 4 provides a historical excursion through some of the developments of astronomy as a driving force in mathematics, together with the biographies of some of the main contributors. Chapter 5 gives a leisurely introduction to graphs and circuits, thereby varying somewhat from the central theme of functions. Among the topics touched upon in this chapter are Euler and Hamilton circuits, complete graphs, and the traveling salesman problem. Chapter 6 briefly describes the mathematics underlying problems of social choice and voting methods in social sciences, whereas Chapter 7 turns to elementary probability theory and the functions occuring there. This chapter also gives a quick introduction to naive set theory. Methods of statistics are explained in Chapter 8, including the representation of data, the dispersion of data, the normal distribution, and confidence intervals. Again the continued emphasis is on concrete examples rather than on rigorous abstract definitions. Another distinguishing feature of this elementary textbook is Chapter 9, where mathematics in music and in cryptology is depicted, mainly through sections on arithmetical residue classes and music notes, the circle of fifths in music theory, and modular arithmetic in cryptology. Finally, Chapter 10 gives a brief introduction to mathematical modeling by means of linear interpolation, prediction in linear regression via the so-called Wald function, and further examples of nonlinear modeling functions and transforms of data. Each section ends with its own exercise set, and each chapter contains a so-called "chapter review test" for self-control. Also, there are an extra section providing solutions to all odd-numbered exercises, a carefully compiled glossary, and a list of references for additional and further reading. As a mathematical textbook for non-mathematicians, the present primer fulfills its task completely and perfectly. Being the outcome of about twenty years of the author's thinking and teaching, this book is a lovely invitation to mathematics as a whole, with numerous illustrating pictures, instructive examples, and quite a bit of non-standard material covered. No doubt, this book will appeal to a wide audience of students and instructors likewise.

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