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Book reviews

Keith Devlin; Finding Fibonacci. The quest to rediscover the forgotten mathematical genius who changed the world.
Princeton University Press, Princeton NJ, 2017, vi+241 p., ISBN: 978-0-691-17486-0/hbk; 978-1-4008-8553-4/ebook

Keith Devlin is a professional mathematician and a successful popular science writer with 35 published books, both academic and for the general public as well, commentator to a weekly emission of the National Public Radio (USA), known as "the Math Guy". In 2002, intrigued by the scarcity of known facts about the distinguished Italian mathematician of the Middle Ages, Leonardo da Pisa (or Pisano), known also as Fibonacci (cca. 1175-1250), the author embarked on a quest to fill in this gap. After several visits in Italy, consultations with some Italian mathematicians and historians and manuscript hunting over several Italian archives, the conclusions were published in two books: *The Man of Numbers: Fibonacci's Arithmetic Revolution*, Walker Books (2011), 192 pp, and *Leonardo and Steve: the young genius who beat Apple to market by 800 Years*, Ted Weinstein (2011), e-book. In these books he analyzes the great influence the books written by Fibonacci (particularly *Liber Abbaci*) had on the development of knowledge and economy (mainly the trade) in that period. The revolutionary idea of Fibonacci was the introduction of the Hindu-Arabic decimal system of numeration, the rules for the arithmetic operations done using this system, and practical applications to everyday life. The author arrives at the conclusion that some shorter, practical versions (devoted to general public, written in local dialects) of the book that circulated in that period and later, have all at their origin a short version written by Fibonnaci himself.

In the present book the author tells the story of this quest - the people he met and who helped him, descriptions of places he visited and some happy events that made his plan realizable. The author mentions three major lucky events of this kind:

- the meeting in 2001 with the Italian historian of medieval mathematics at the University of Siena - Rafaella Franci;
- the translation in English (the first and the only) of *Liber Abbaci* by Laurence Sigler, completed after his death by his wife Judith Sigler, published with Springer in 2002;
- a paper, *Fibonacci and the financial revolution* (20 pp), published by William Goetzmann in 2004 (discussed in Ch. 15, *Leonardo and the modern finance*).

All these are described in the book, along with some information on some geographic and touristic aspects from Italy (with photographes) and details of the discussions and on the people he met. A chapter, (Ch. 14, *This will change the world*) is dedicated to the parallelism between the revolution done by Fibonacci and that done by Steve Jobs with the introduction of personal computers, in particular of Apple Macintosh in 1984 - both were done by a single person and involved computation with target to the marketplace. This is treated at large in the above mentioned book on Leonardo and Steve.

Written in the alert and attractive style characteristic to all popular writings of the author, with a lot of information of various various kind - personal, about people and places, historical, mathematical - this book, based on a diary kept by the author, will attract a large audience interested to know the story of this genius of the Middle Ages whose books influenced so much de development of the modern Western civilization up to our days, unfairly forgotten and neglected until the sixtieth of the last century.

S. Cobzaş

Petro-Luciano Buono; Advanced Calculus. Differential Calculus and Stokes' Theorem, De Gruyter Textbook, De Gruyter, Berlin/Boston 2016, x+303 p., (ISBN 978-3-11-043821-5/pbk; 978-3-11-043822-2/ebook.

The book is based on the notes of a one-semester Calculus III course at the University of Ontario Institute of Technology starting with 2012. Its aim is to give a unified treatment of Green's, Stokes and Gauss' theorems (in $\mathbb{R}^2$ and $\mathbb{R}^3$), paving the way to more advanced topics from differential geometry. The approach proposed by the author has a geometric flavor, the tangent space being introduced early in the study of differentiability of functions of one variable, differential forms and pullbacks. The main advantage of this approach, based on tools from linear algebra, consists in the possibility to define the differential of a function properly, as acting on tangent vectors, and from there the study of differential forms and pullbacks in the context of line integrals. As the author mentions in the Preface, one starts with the introduction of terminology in the context of curves (one-dimensional geometric objects, easier to understand) and then, after the introduction of the differentials of vector functions of several variables and of the Jacobian, one extends the differential form concepts to higher dimensions.

The one dimensional case is treated in Chapters 2, *Calculus of vector functions*, 3, *Tangent spaces and 1-forms*, and 4, *Line integrals*. The first chapter of the book contains some preliminary results form set theory, linear algebra, curves and surfaces (with illustrations in $\mathbb{R}^2$ and $\mathbb{R}^3$).

The general case of differential calculus for mappings from $\mathbb{R}^n$ to $\mathbb{R}^m$ is considered in Chapters 5, *Differential calculus of mappings*, and 6, *Applications of differential calculus* (including the study of extrema, parametrizations of curves and surfaces). Chapter 7, *Double and triple integrals*, contains a presentation of Riemann integral for domains in $\mathbb{R}^2$ and $\mathbb{R}^3$ and a proof of Green's theorem in $\mathbb{R}^2$.

General k-forms a treated in Chapter 8, *Wedge products and exterior derivatives*, and their integration in Chapter 9, *Integration of forms* (pullbacks, change of variables, orientation of surfaces). Stokes' theorem (in $\mathbb{R}^3$) is proved in Chapter 10, *Stokes' theorem and applications* (including a version for vector fields).

The characteristic features of the book are the abundance of worked examples, illustrated by nicely drawn suggestive figures and the excellent layout (the author promises to make available to the mathematical community the codes of the figures). There are also exercises at the end of each section.

The book is clearly written, in a pleasant style, and can be recommended as a textbook for advanced calculus courses.

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