PREFACE

In the fall of 2000, I was assigned to teach history of mathematics on the retirement of the person who usually did it. And this with no more reason than the historical snippets that I had included in my previous book, *Fourier Analysis and Boundary Value Problems*. I was clearly fond of history.

Initially, I was unhappy with this assignment because there were two obvious difficulties from the start: (i) how to condense about 6000 years of mathematical activity into a three-month semester? and (ii) how to quickly learn all the mathematics created during those 6000 years? These seemed clearly impossible tasks, until I remembered that Joseph LaSalle (chairman of the Division of Applied Mathematics at Brown during my last years as a doctoral student there) once said that the object of a course is not to cover the material but to uncover part of it. Then the solution to both problems was clear to me: select a few topics in the history of mathematics and uncover them sufficiently to make them meaningful and interesting. In the end, I loved this job and I am sorry it has come to an end.

The selection of the topics was based on three criteria. First, there are always students in this course who are or are going to be high-school teachers, so my selection should be useful and interesting to them. Through the years, my original selection has varied, but eventually I applied a second criterion: that there should be a connection, a thread running through the various topics through the semester, one thing leading to another, as it were. This would give the course a cohesiveness that to me was aesthetically necessary. Finally, there is such a thing as personal taste, and I have felt free to let my own interests help in the selection.

This approach solved problem (i) and minimized problem (ii), but I still had to learn what happened in the past. This brought to the surface another large set of problems. The first time I taught the course, I started with secondary sources, either full histories of mathematics or histories of specific topics. This proved to be largely unsatisfactory. For one thing, coverage was not extensive enough so that I could really learn the history of my chosen topics. There is also the fact that, frequently, historian A follows historian B, who in turn follows historian C, and so on. For example, I have at least four books in my collection that attribute the ratio test for the convergence of infinite series to Edward Waring, but without a reference. I finally traced this partial misinformation back to Moritz Cantor's *Vorlesungen über Geschichte der Mathematik*.[1] This is history by hearsay, and I could not fully put my trust in it. There is also the matter of unclear or insufficient references, with the additional problem that sometimes they are to other secondary sources. Finally, I had to admit that not all secondary sources offer the truth, the whole truth, and nothing but the truth (Rafael Bombelli, the discoverer of complex numbers, has particularly suffered in this respect). The long and the short of it is this: it's a jumble out there.

After my first semester teaching the course, it was obvious to me that I had to learn the essential facts about the work of any major mathematician included here straight from the horse's mouth. I had to find original sources, or translations, or reprints. I enlisted the help of our own library and the Boston Library Consortium, with special thanks to MIT's Hayden Library. Beyond this, I relied on the excellent service of our Interlibrary Loan Department. But even all this would have been insufficient and this book could not have been written in its present form. I purchased a large collection of books, mostly out of print and mostly on line, and scans of old books on CD, all of which were of invaluable help. Special thanks are also due to the *Gottfried Wilhelm Leibniz Bibliothek*, of Hanover, for copies of the relevant manuscripts of Leibniz on his discovery of the calculus. As for the rest, the very large rest, I went on line to several digitized book collections from around the world, too many to cite individually. It is a wonder to me that history of mathematics could be done before the existence of these valuable resources.

Many of the works I have consulted are already translated into English (such as those by Ptolemy, Aryabhata, Regiomontanus, some of Viète's, Napier, Briggs, Newton, and—to a limited and unreliable extent—Leibniz), but in most other cases the documents are available only in the language originally written in or in translations into languages other than English (such as those by Al Tusi, Saint Vincent, Bombelli, most of Gregory's, Fermat, Fourier, da Cunha, and Cauchy). Except by error of omission, the translations in this book that are not credited to a specific source are my own, but I wish to thank my colleague Rida Mirie for his kind help with Arabic spelling and translation.

[1] Vol. 4, B. G. Teubner, Leipzig, 1908, p. 275. Cantor gave the reference, but with no page number, and then he put his own misleading interpretation of Waring's statement in quotation marks! For a more detailed explanation of Waring's test, stronger than the one given later by Cauchy, see note 21 in Chapter 6.

As much as I believe that a text on mathematics must include as many proofs as possible at the selected level, for mathematics without proofs is just a story, I also believe that history without complete and accurate references is just a story, a frustrating one for many readers. I have endeavored to give as complete a set of references as I have been able to. Not only to original sources but also to facsimiles, translations into several languages, and reprints, to facilitate the work of the reader who wishes to do additional reading. These details can be found in the bibliography at the end of the book. For easy and immediate access, references are also given in footnotes at each appropriate place, but only by the author's last name, the work title, volume number if applicable, year of publication the first time that a work is cited in a chapter, and relevant page or pages.

I can only hope that readers enjoy this book as much as I have enjoyed writing it.

Dunstable, Massachusetts *Enrique A. González-Velasco*
June 15, 2010

http://www.springer.com/978-0-387-92153-2

Journey through Mathematics
Creative Episodes in Its History
González-Velasco, E.A.
2011, XI, 466 p., Hardcover
ISBN: 978-0-387-92153-2