Great Mathematics Books of the Twentieth Century

A Personal Journey

二十世纪伟大的数学书

个人之旅

— Lizhen Ji

高等教育出版社
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A Personal Journey

ERSHI SHIJI WEIDA DE SHUXUESHU

二十世纪伟大的数学书
个人之旅

季理真

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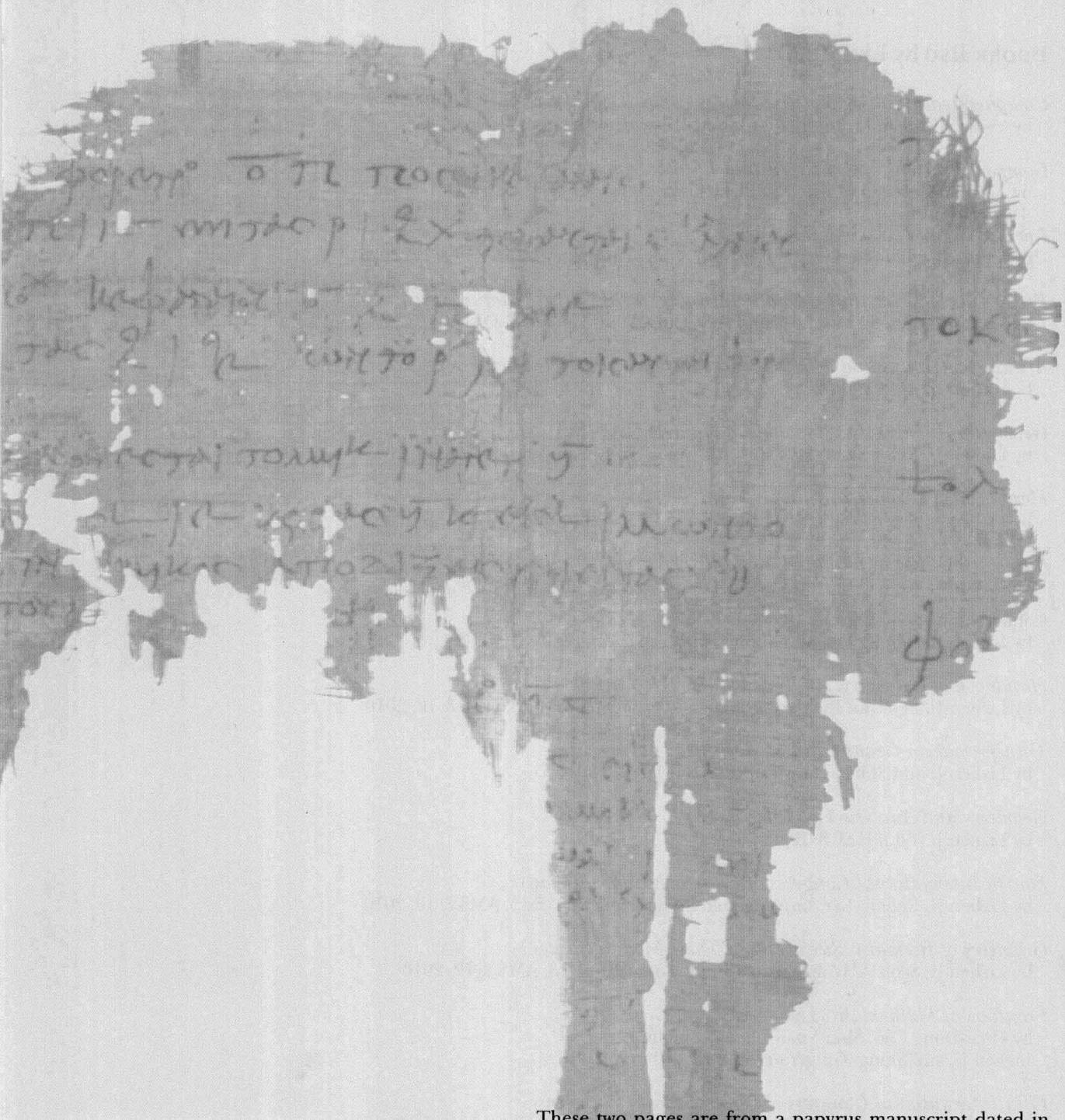
Great Mathematics Books of the Twentieth Century

A Personal Journey

Lizhen Ji



These two pages are from a papyrus manuscript dated in early second century A.D. They contain tables of fractions with prime denominators, followed by arithmetical problems concerning conversions between silver and copper money and between wheat standards, as well as calculations of carriage charges and of interests. They are in the special collection of University of Michigan.

Books also by Lizhen Ji

Compactifications of Symmetric Spaces
by Yves Guivarc'h, Lizhen Ji, and John C. Taylor, Birkhäuser, 1998

Compactifications of Symmetric and Locally Symmetric Spaces
by Armand Borel and Lizhen Ji, Birkhäuser, 2005

Lie Groups and Automorphic Forms
by Lizhen Ji, Jian-Shu Li, H.W. Xu, and Shing-Tung Yau (Ed.), AMS & IP, 2006

Proceedings of The 4th International Congress of Chinese Mathematicians
by Lizhen Ji, Kefeng Liu, Lo Yang, and Shing-Tung Yau (Ed.), HEP & IP, 2007

Arithmetic Groups and Their Generalizations: what, why, how?
by Lizhen Ji, AMS & IP, 2008

Geometry, Analysis and Topology of Discrete Groups
by Lizhen Ji, Kefeng Liu, Lo Yang, and Shing-Tung Yau (Ed.), HEP & IP, 2008

Handbook of Geometric Analysis Vol. I
by Lizhen Ji, Peter Li, Richard Schoen, and Leon Simon (Ed.), HEP & IP, 2008

Automorphic Forms and the Langlands Program
by Lizhen Ji, Kefeng Liu, and Shing-Tung Yau (Ed.), HEP & IP, 2009

Cohomology of Groups and Algebraic K-theory
by Lizhen Ji, Kefeng Liu, and Shing-Tung Yau (Ed.), HEP & IP, 2009

Handbook of Geometric Analysis Vol. II, III
by Lizhen Ji, Peter Li, Richard Schoen, and Leon Simon (Ed.), HEP & IP, 2010

Transformation Groups and Moduli Spaces of Curves
by Lizhen Ji and Shing-Tung Yau (Ed.), HEP & IP, 2010

Geometry and Analysis Vol. I, II
by Lizhen Ji (Ed.), HEP & IP, 2010

Fourth International Congress of Chinese Mathematicians
by Lizhen Ji, Kefeng Liu, Lo Yang, and Shing-Tung Yau (Ed.), AMS & IP, 2010

Geometry of Riemann Surfaces and Their Moduli Spaces
by Lizhen Ji, Scott A. Wolpert, and Shing-Tung Yau (Ed.), AMS & IP, 2010

Frontiers of Mathematical Sciences
by Huai-Dong Cao, Shiu-Yuen Cheng, Binglin Gu,
Lizhen Ji, and Shing-Tung Yau (Ed.), IP, 2011

Fifth International Congress of Chinese Mathematicians
by Lizhen Ji, Yat Sun Poon, Lo Yang, and Shing-Tung Yau (Ed.), AMS & IP, 2012

Open Problems and Surveys of Contemporary Math
by Lizhen Ji, Yat Sun Poon, and Shing-Tung Yau (Ed.), HEP & IP, 2013

The reading of all good books is like a conversation with the finest men of past centuries.
—— René Descartes

There is no friend as loyal as a book.
—— Ernest Hemingway

If we encounter a man of rare intellect, we should ask him what books he reads.
—— Ralph Waldo Emerson

A room without books is like a body without a soul.
—— Marcus Tullius Cicero

A house without books is like a room without windows.
—— Horace Mann

I guess there are never enough books.
—— John Steinbeck

The odd thing about people who had many books was how they always wanted more.
—— Patricia A. McKillip

I have always imagined that Paradise will be a kind of library.
—— Jorge Luis Borges

My best friend is a person who will give me a book I have not read.
—— Abraham Lincoln

I cannot live without books.
—— Thomas Jefferson

There are two motives for reading a book: one, that you enjoy it: the other, that you can boast about it.
—— Bertrand Russell

书富如入海，百货皆有。人之精力，不能兼收尽取，但得春所欲求者尔。故愿学者每次作一意求之。

—— 苏轼

发奋识遍天下字，立志读尽人间书。

—— 苏轼

路漫漫其修道远，吾将上下而求索。

—— 屈原

饭可以一日不吃，觉可以一日不睡，书不可以一日不读。

—— 毛泽东

好读书，不求甚解；每有会意，便欣然忘食。

—— 陶渊明

This is a very impressive job for both educators and researchers in mathematics. It collects basically all the important nontechnical books written by great mathematicians. The author also gave insightful comments on these books. This is especially important for those who want to get a global view about mathematics. The author writes with humors and so the book is not dry to read. I am amazed by the author's energy in preparing this book.

Shing-Tung Yau

Fields Medalist, Wolf Prize Winner, Harvard University

海量的数学书，哪些值得我们认真读，哪些读后让我们对数学有更好的认识，这些对门外汉、学生、年轻的学者和专家都是非常需要解决的问题。季理真教授的新作《二十世纪伟大的数学书——个人之旅》（*Great Mathematics Books of the Twentieth Century: A Personal Journey*）在这个问题上为我们带来了极大的便利。本书比较全面收列了二十世纪以来最有影响的数学书并恰当地加以简评和引述其他评论。本书收列的书目范围之广，数量之大令人吃惊，这需要作者广阔的视野、艰辛的工作，并花大量的时间请教很多不同方向的专家。季理真教授完成了一项很有意义的工作。我相信大家都会欢迎这本书并能从中获益。

席南华

中国科学院院士，中国科学院数学与系统科学研究院

This book provides an excellent and comprehensive map for your mathematical journey. It will guide you to the right direction and path for advanced studies in almost all mathematical fields.

杨乐

中国科学院院士，中国科学院数学与系统科学研究院

阿贝尔有句名言："向大师学习！"本书正是通往大师作品的极佳引导，相信会使广大数学工作者，无论是初始的学生还是成熟的学者，都受益匪浅。

张伟平

中国科学院院士，南开数学所

Unlike other sciences, old mathematical literature has a life of its own because it records not only the background, but also so much of the detailed technical knowledge, for the mathematics of today. This remarkable book is the first one to attempt to analyse the vast literature arising from 20th century mathematics. It lists and comments on a selection of the most influential books written during this time in all of the major fields of mathematics.

John Henry Coates

Fellow of the Royal Society, Senior Whitehead Prize Winner, Cambridge University

This book gives a survey of the influential books in mathematics, touching upon almost all fields of mathematics. This is a very impressive piece of work. It reminds me of the book: A Panorama of Pure Mathematics, written by Dieudonne, except that it is of more practical value since it tells readers where to look further.

Unlike other scientific disciplines that give introductory courses such as "General Physics", "General Chemistry" or "Introduction to Molecular Biology", mathematics does not offer such a course. Consequently, it is very difficult for beginning mathematics students to get an overview of mathematics, what each subject is about, and how different subjects are put together. Books like this one is of great value for filling in that gap.

鄂维南

中国科学院院士，北京国际数学中心

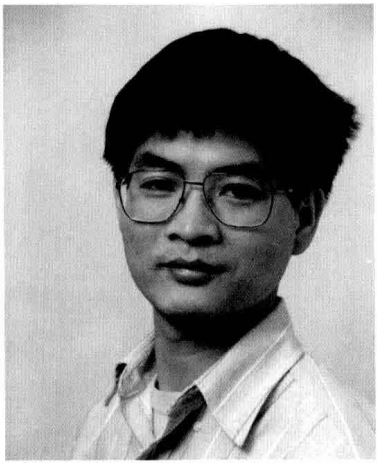
An unusual idea: to write a catalog of the math books you love and/or respect. Anyone's personal list of "great" books is bound to be idiosyncratic but can also be a useful complement for students to other entry points into the world of scholarly books.

David Mumford

Fields Medalist, Shaw Prize Winner, Brown University

About the book

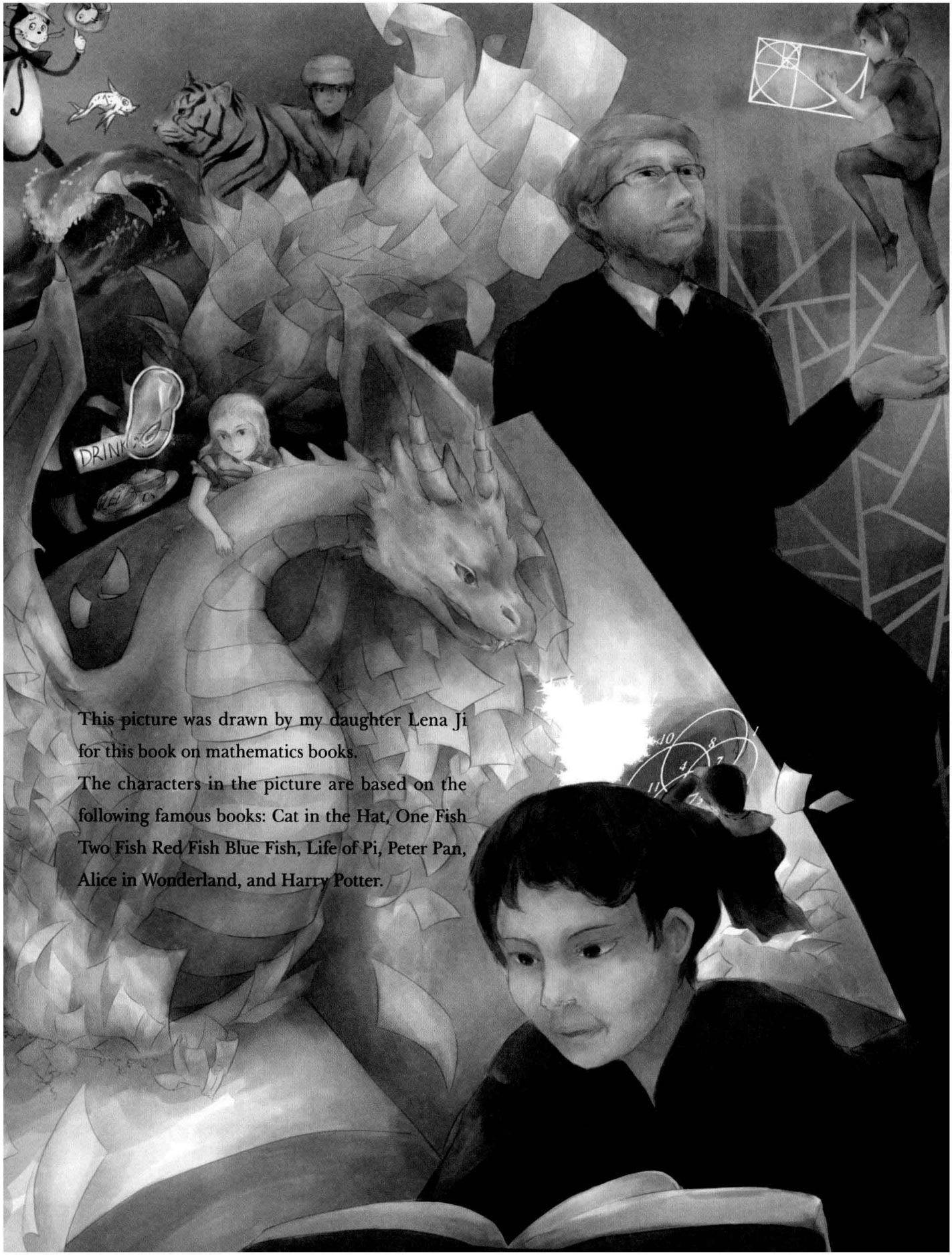
Mathematics has a long history and is also forever new. A lot of work had been done in the ancient times, many deep results were obtained in the twentieth century, and exciting theories are being developed. What are important concepts, theories, theorems and conjectures in mathematics? One effective way is to read great books in mathematics. Which are great books, especially books which are read by the working mathematicians now? Like everything else under the sun, it takes time to gain perspective and judge the importance of mathematical results. This book on books provides a guide to the great mathematics books in the twentieth century. It also provides concise summaries of all major subjects in contemporary mathematics. Unlike other disciplines in science, mathematics enjoys strong continuity: whatever was proved always stays true and can serve as the solid foundation for future theories, and old mathematics books are often of more than only historical interests. In view of this, this book also contains many pictures of ancient mathematics books by the old masters such as Euler, Galileo, Gauss, Kepler, Leibniz, Newton, Poincare et al, which can be both informative and enjoyable.



About the author

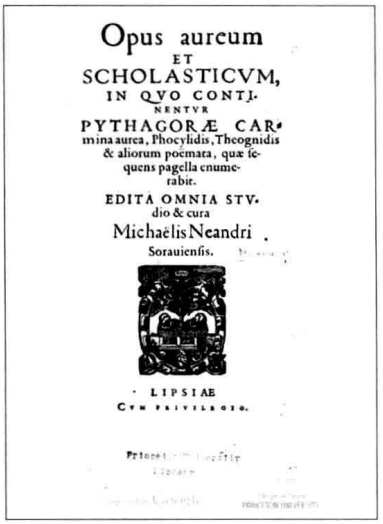
Lizhen Ji is a professor of mathematics at University of Michigan and studies subjects related to Lie groups, discrete subgroups of Lie groups, transformation groups and related spaces. He loves books and is a chief-editor of four book series: Advanced Lectures in Mathematics, Mathematics and Humanities, Panorama of Mathematics, Surveys of Modern Mathematics, and of the journal Pure and Applied Mathematics Quarterly. He is also an editor of journals Asian Journal of Mathematics and Science in China: Mathematics.

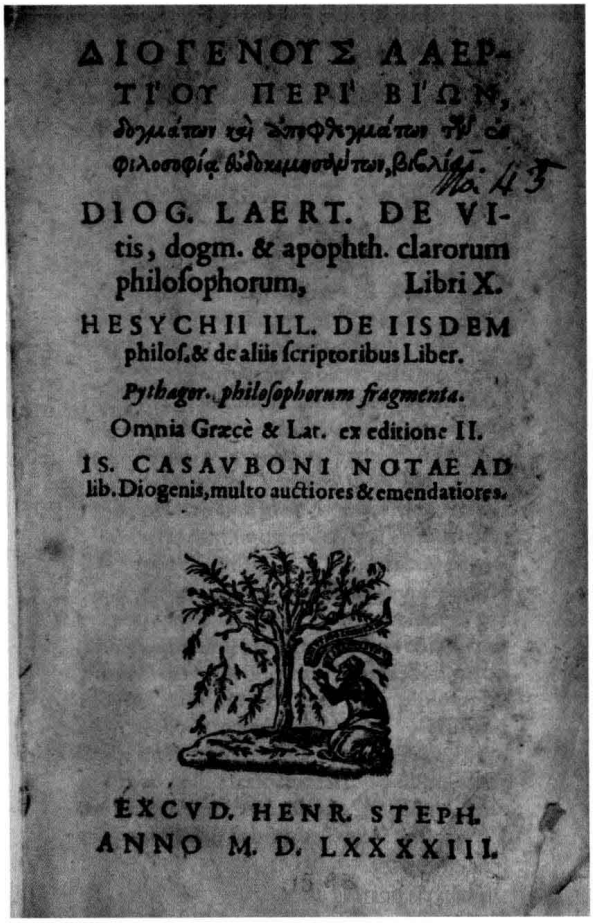
He was a Sloan Fellow and received the NSF postdoctoral Fellowship and the Morningside Silver Medal of Mathematics. He enjoys listening to good mathematics talks on diverse topics and has organized over 30 summer schools, conferences or workshops. He is also an active organizer of seminars and colloquiums. For example, he is the organizer of one of the first seminars called "What is ..." in the world.



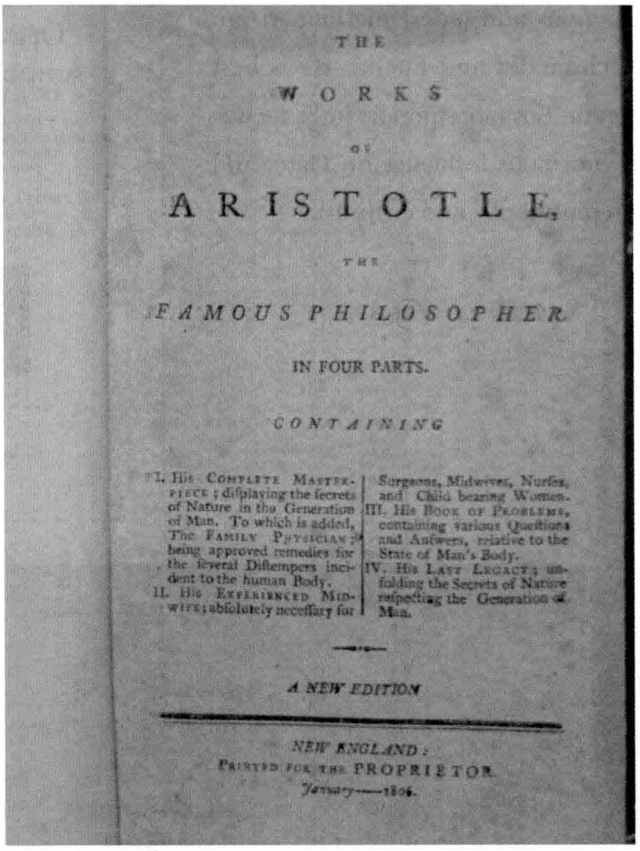
This picture was drawn by my daughter Lena Ji for this book on mathematics books.
The characters in the picture are based on the following famous books: Cat in the Hat, One Fish Two Fish Red Fish Blue Fish, Life of Pi, Peter Pan, Alice in Wonderland, and Harry Potter.

Pythagoras might be the most famous and oldest mathematician and philosopher, well before Archimedes and Euclid. He is best known for the Pythagorean Theorem. But more importantly, he was a philosopher. His ideas had an enormous influence on Plato, and through him, on all of the western philosophy and civilization.


Opus aureum
ET
SCHOLASTICVM,
IN QVO CONTI-
NENTVR
PYTHAGORÆ CAR-
mina aurea, Phocylidis, Theognidis
& aliorum poemata, quæ se-
quens pagella enume-
rabit.
EDITA OMNIA STV-
dio & cura
Michaëlis Neandri
Soraviensis.
LIPSIAE
CVM PRIVILEGIO.


ΔΙΟΓΕΝΟΥΣ ΛΑΕΡ-
ΤΙΟΥ ΠΕΡΙ ΒΙΩΝ,
δογμάτων καὶ ἀποφθεγμάτων τῶν ἐν
φιλοσοφίᾳ εὐδοκιμησάντων, βιβλία.
DIOG. LAERT. DE VI-
tis, dogm. & apophth. clarorum
philosophorum, Libri X.
HESYCHII ILL. DE IISDEM
philos. & de aliis scriptoribus Liber.
Pythagor. philosophorum fragmenta.
Omnia Græcè & Lat. ex editione II.
IS. CASAVBONI NOTAE AD
lib. Diogenis, multo auctiores & emendatiores.
EXCVD. HENR. STEPH.
ANNO M. D. LXXXXIII.

■ Pythagoras (about 570 –495 BC)



THE

WORKS

OF

ARISTOTLE,

THE

FAMOUS PHILOSOPHER.

IN FOUR PARTS.

CONTAINING

I. His COMPLETE MASTERPIECE; displaying the secrets of Nature in the Generation of Man. To which is added, The FAMILY PHYSICIAN; being approved remedies for the several Distempers incident to the human Body.
II. His EXPERIENCED MIDWIFE; absolutely necessary for Surgeons, Midwives, Nurses, and Child bearing Women.
III. His BOOK OF PROBLEMS, containing various Questions and Answers, relative to the State of Man's Body.
IV. His LAST LEGACY; unfolding the Secrets of Nature respecting the Generation of Man.

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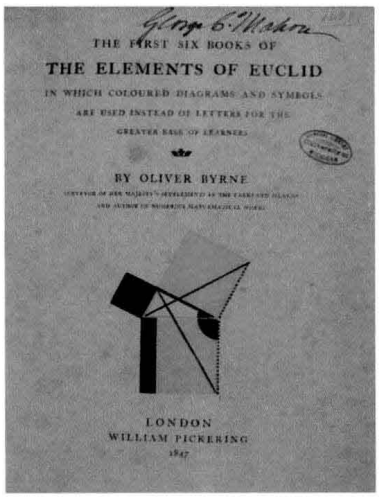
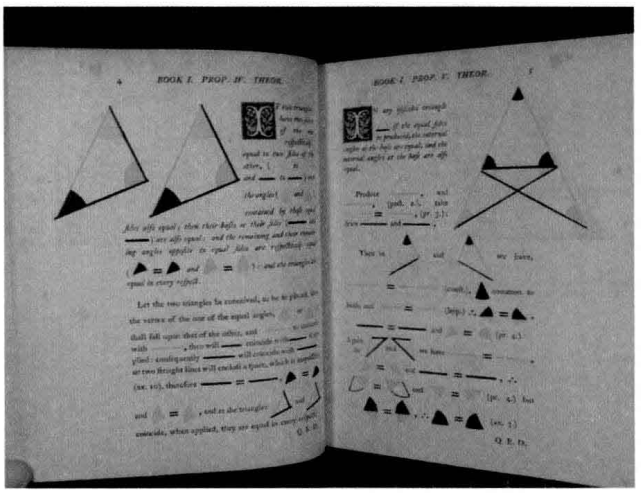
PRINTED FOR THE PROPRIETOR.
January——1806.

Aristotle is one of the few people in the history who had a long-lasting on the world civilization, especially the western civilization. He wrote extensively and his writings cover many subjects such as physics, logic, philosophy, poetry, theater, music, rhetoric, linguistics, biology, zoology etc. His theories and writings were often cited as authorities to such an extent that they could be harmful. Besides logic, he did not contribute too much to mathematics. But he used mathematics in several important ways: mathematics serves as a model for his philosophy of science and provides him with some important techniques and arguments for his theories in subjects such as physics, biology and ethics.

■ Aristotle (384 BC – 322 BC)

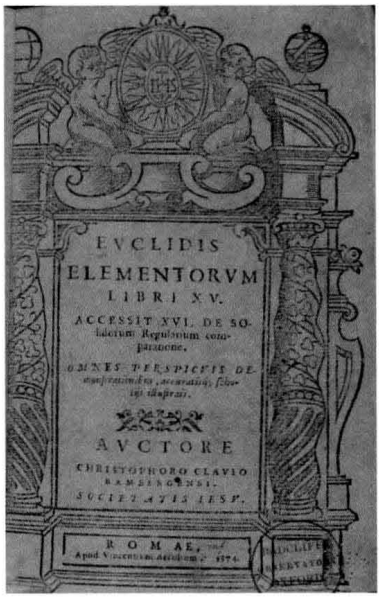
Which book is the most influential textbook since the beginning of civilization? The answer is clearly Euclid's Elements. Up to the 20th century, every educated person was supposed to be familiar with the Euclidean geometry, and this book was used until 1950. As the famous Bacon said famously: *mathematics makes one subtle.*





Euclid's classical textbook *Elements* was printed in color in 1847.

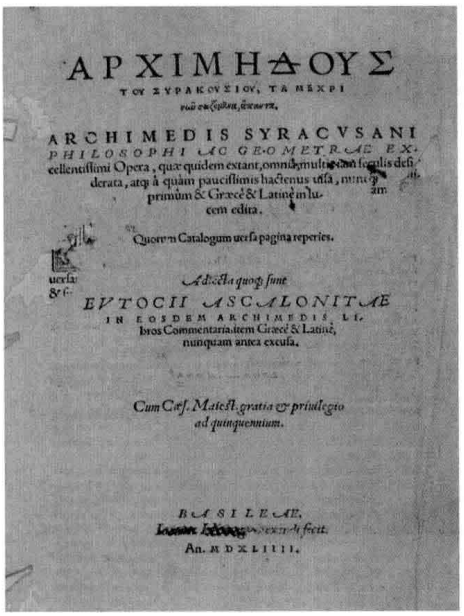
Remember that only recently mathematics textbooks are printed in color.



A version of Euclid's book Elements published in 1574. This edition is the earliest one I have seen in the original book form. The first printed edition appeared in 1482, based on an Arabic edition from nineth century.

■ Euclid(325 BC – 265 BC)

People often like to pick the top five greatest mathematicians, and Archimedes is usually on the short list. His interests were broad and people still discover "new" ideas in his works.


ΑΡΧΙΜΗΔΟΥΣ
ΤΟΥ ΣΥΡΑΚΟΥΣΙΟΥ, ΤΑ ΜΕΧΡΙ
ΝΥΝ ΣΩΖΟΜΕΝΑ, ΑΠΑΝΤΑ.
ARCHIMEDIS SYRACVSANI
PHILOSOPHI AC GEOMETRAE EX-
cellentissimi Opera, quæ quidem extant, omnia: multa etiam fœtilis desi-
derata, atq; à quàm paucissimis hactenus visa, nunc primùm & Græcè & Latinè in lu-
cem edita.
Quorum Catalogum uersa pagina reperies.
Adiecta quoq; sunt
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IN EOSDEM ARCHIMEDIS, LI-
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ad quinquennium.
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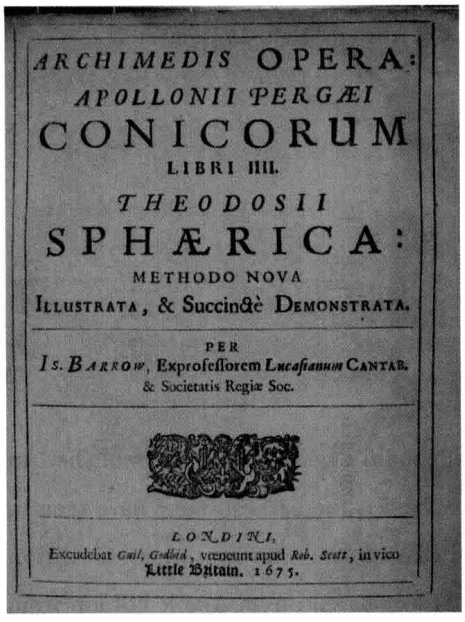
An. MDXLIIII.

A book by Archimedes.


ARCHIMEDIS OPERA:
APOLLONII PERGÆI
CONICORUM
LIBRI IIII.
THEODOSII
SPHÆRICA:
METHODO NOVA
ILLUSTRATA, & Succinctè DEMONSTRATA.
PER
Is. BARROW, Exprofessorem Lucasianum CANTAB.
& Societatis Regiæ Soc.
LONDINI,
Excudebat Guil. Godbid, veneunt apud Rob. Scott, in vico
Little Britain. 1675.

Archimedes, collected works.

■ Archimedes (287 BC –212 BC)