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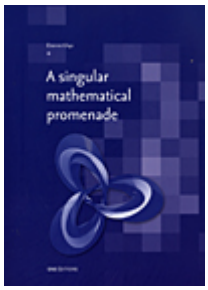
A Singular Mathematical Promenade



Étienne Ghys

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The Basic Library List Committee recommends this book for acquisition by undergraduate mathematics libraries.

MAA REVIEW | TABLE OF CONTENTS

[Reviewed by Frank Swetz, on 01/24/2019]

There is some whimsy in the conception of this book's title. The word "singular" does not refer to a unitary encounter but to singular points of a planar algebraic curve and the "promenade", a mathematical tour of many concepts. The tour is leisurely but those mathematically "out of condition" might find the going a little tough.

The author, Étienne Ghys, Director of Research at the École Normale Superiere de Lyon, is a versatile mathematician and a skilled communicator, both with words and visual images. This book abounds with appealing and informative images, especially the supporting computer graphics. Ghys was prompted on this writing task by the realization that the relative position of the graphs of four real polynomials is subject to some constraints, a fact brought to his attention by a colleague, Maxim Kontsevich, in 2009. "Ah, at this relatively late date, we can still learn something new about the behavior of polynomials." Intrigued by this finding, and seeking to further understand and generalize it, he began on the mathematical adventure that has become the subject of this book.

A variety of mathematical tools, algebraic, computational, combinatorial, topological and graphical, are employed in achieving a desired understanding. Each individual chapter provides a rich read. Consider the title of one such chapter: "The Hipparchus-Schroeder-Tamari-Stasheff Associahedron" where the legacy of name recognition spans centuries, going from the ancient to the modern. As for the "associahedron", let the reader identify this creature.

This is a wonderfully crafted book. While its text demonstrates a fine example of mathematical exposition and how history can be used to scaffold and enrich a contemporary mathematical investigation, some mathematical maturity is required to fully appreciate the beauty presented. In a spirit of scholarly congeniality, author Ghys has relinquished his rights to all the book's material for which he is directly responsible. Readers may freely duplicate or distribute this material as they desire.

This book can be purchased from the ENS Lyon web site. It is also available online in many places, including AMS Open Math Notes.

Frank Swetz, Professor of Mathematics and Education, Emeritus, The Pennsylvania State University, is the author of several books on the history of mathematics. His research interests focus on societal impact on the development, and the teaching and learning, of mathematics.

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