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Stories about Maxima and Minima

V. M. Tikhomirov
translated by Abe Shenitzer

Throughout the history of mathematics, maximum and minimum problems have played an important role in the evolution of the field. Many beautiful and important problems have appeared in a variety of branches of mathematics and physics, as well as in other fields of sciences. The greatest scientists of the past—Euclid, Archimedes, Heron, the Bernoullis, Newton, and many others—took part in seeking solutions to these concrete problems. The solutions stimulated the development of the theory, and, as a result, techniques were elaborated that made possible the solution of a tremendous variety of problems by a single method.

This book, copublished with the Mathematical Association of America (MAA), presents fifteen “stories” designed to acquaint readers with the central concepts of the theory of maxima and minima, as well as with its illustrious history. Unlike most AMS publications, the book is accessible to high school students and would likely be of interest to a wide variety of readers.

In Part One, the author familiarizes readers with many concrete problems that lead to discussion of the work of some of the greatest mathematicians of all time. Part Two introduces a method for solving maximum and minimum problems that originated with Lagrange. While the content of this method has varied constantly, its basic conception has endured for over two centuries. The final story is addressed primarily to those who teach mathematics, for it impinges on the question of how and why to teach. Throughout the book, the author strives to show how the analysis of diverse facts gives rise to a general idea, how this idea is transformed, how it is enriched by new content, and how it remains the same in spite of these changes.

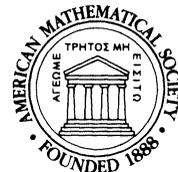
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Mathematical Impressions

Anatoliĭ T. Fomenko

“I think of my drawings as if they were photographs of a strange but real world, and the nature of this world, one of infinite objects and processes, is not well known. Clearly there is a connection between the mathematical world and the real world.... This is the relationship I see between my drawings and mathematics.”—Anatoliĭ Fomenko, in the Introduction

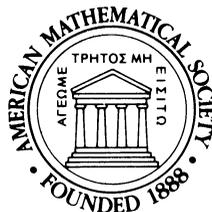
Anatoliĭ Fomenko is a Soviet mathematician with a talent for expressing abstract mathematical concepts through artwork. Some of his works echo those of M.C. Escher in their meticulous rendering of shapes and patterns, while other pieces seem to be more visceral expressions of mathematical ideas. Stimulating to the imagination and to the eye, his rich and evocative work can be interpreted and appreciated in various ways—mathematical, aesthetic, or emotional.

This book contains 84 reproductions of works by Fomenko (23 of them in color). In the accompanying captions, Fomenko explains the mathematical motivations behind the illustrations as well as the emotional, historical, or mythical subtexts they evoke. The illustrations carry the viewer through a mathematical world consisting not of equations and dry logic, but of intuition and inspiration.

Since the mid-1970s, Fomenko has created more than 280 illustrations. Not only have his images filled pages of his own numerous books on geometry, but they have also been chosen to illustrate books on other subjects, such as statistics, probability, and number theory. In addition, his works have found their way into the Soviet scientific and popular press and have been displayed in more than 100 exhibits in the Soviet Union, Holland, India, and much of Eastern Europe.

Fomenko describes his images as “deep reflections about the essence of being and about the place of modern man—in particular, the learned man—in the stormy and unpredictable world surrounding him.” His illustrations are the product of a sensitive, aesthetically attuned mind diving deep below the surface of modern mathematics and emerging with great stories to tell.

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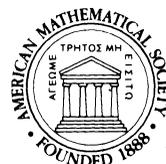
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