
Preface to the Second Edition

The moving power of mathematical invention is not reasoning but imagination.

Augustus de Morgan

I released this book over twenty years ago. Since then she lived her own life, quite separately from me. Let me briefly trace her life here.

In March 1989, her title, *Mathematics as Problem Solving*, became the first “standard for school mathematics” of the National Council of Teachers of Mathematics [2]. In 1995, her French 4000-copy edition, *Les mathématiques par la résolution de problèmes*, Éditions du Choix, quickly sold out.

She was found charming and worthy by Paul Erdős, Martin Gardner, George Berszenyi, and others:

The problems faithfully reflect the world-famous Russian school of mathematics, whose folklore is carefully interwoven with more traditional topics. Many of the problems are drawn from the author’s rich repertoire of personal experiences, dating back to his younger days as an outstanding competitor in his native Russia and spanning decades and continents as an organizer of competitions at the highest level. – George Berzsényi

The book contains a very nice collection of problems of various difficulties. I particularly liked the problems on combinatorics and geometry. – Paul Erdős

Professor Soifer has put together a splendid collection of elementary problems designed to lead students into significant mathematical concepts and techniques. Highly recommended. – Martin Gardner

In the “extended” *American Mathematical Monthly* review, Cecil Rousseau paid her a high compliment:

Retelling the best solutions and sharing the secrets of discovery are part of the process of teaching problem solving. Ideally, this process is characterized by mathematical skill, good taste, and wit. It is a characteristically personal process and the best such teachers have surely left their personal marks on students and readers. Alexander Soifer is a teacher of problem solving and his book, Mathematics as Problem Solving, is designed to introduce problem solving to the next generation.

This poses a problem: how does one reach out to the next generation and charm it into reading and doing mathematics? I am deeply grateful to Ann Kostant for solving this problem by inviting a new edition of this book into the historic Springer. I thank Col. Dr. Robert Ewell for converting my sketches into real illustrations. I am so very grateful to the first readers of this manuscript, Branko Grünbaum, Peter D. Johnson, Jr., and Cecil Rousseau for their comments and forewords.

For the expanded Springer edition, I have added a sixth chapter dedicated to my favorite problem of the many problems that I have created, “Chess 7×7 .” I found three beautiful solutions to it. Moreover, this problem was inspired by the “serious” mathematics of Ramsey Theory, and once it was solved, it led me back to the “serious” mathematics of finite projective planes. I hope you will enjoy this additional chapter.

Let me mention for those who would like to read my other book that this book was followed by the books [9, 1, 10] listed in the bibliography. Then there came *The Mathematical Coloring Book* [11], after 18 years of writing. Books [12] and [13] will follow soon, as will new expanded editions of the books [9, 1, 10]. All my books will be published by Springer.

Write back to me; your solutions, problems, and ideas are always welcome!

Alexander Soifer
Colorado Springs, Colorado
May 8, 2008

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Remember but him, who being demanded, to what purpose he toiled so much about an Art, which could by no means come to the knowledge of many. Few are enough for me; one will suffice, yea, less than one will content me, answered he. He said true: you and another are a sufficient theatre one for another; or you to your selfe alone!!

*Michel de Montaigne
Of Solitarinesse. Essayes [6]*

I was fortunate to grow up in the problem-solving atmosphere of Moscow with its mathematical clubs, schools, and Olympiads. The material for this book stems from my participation in numerous mathematical competitions of all levels, from school to national, as a competitor, an organizer, a judge, and a problem writer; but most importantly, from the mathematical folklore I grew up on.

This book contains about 200 problems, over one-third of which are discussed in detail, sometimes even with two or more solutions. When I started, I thought that beauty, challenge, elegance, and surprising results and solutions alone would determine my choices. During my work, however, one more factor powerfully forced itself into account: the interplay of selected problems.

This book is written for high school and college students, teachers, and everyone else desiring to experience the mystery and beauty of mathematics. It can be and has been used as a text for an undergraduate or graduate course or workshop on problem solving.

Auguste Renoir once said that just as some people all their lives read one book (the Bible, for example), so could he paint all his life one painting. I cannot agree with him more. This is the book I am going to write all my life. That is why I welcome so much your comments, corrections, ideas, alternative solutions, and suggestions to include other methods or to cover other areas of mathematics. Do send me

your ideas and solutions: best of them as well as the names of their authors will be included in the future revised editions of this book. I hope, though, that this book will never reach the intimidating size of a calculus text.

One can fairly make an argument that this book is raw, unpolished. Perhaps that is not all bad: sketches by Modigliani give me, for one, so much more than sweated-out oils of Old Masters. Maybe a problem-solving book ought to be a sketch book!

To assign true authorship to these problems is as difficult as to folklore tales. The few references that I have given indicate my source rather than a definitive reference to the first mentioning of a problem. Even problems that I created and published myself might have existed before I was born!

I thank Valarie Barnes for bravely agreeing to type this manuscript; it was her first encounter of the mathematical kind. I thank my student Richard Jessop for producing such a masterpiece of typesetting art.

I am grateful to my parents Yuri and Rebecca for introducing me to the world of arts, and to my children Mark and Julia for inspiration. My special thanks go to the first judges of this manuscript, my students in Colorado Springs and Southampton for their enthusiasm, ideas, and support.

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