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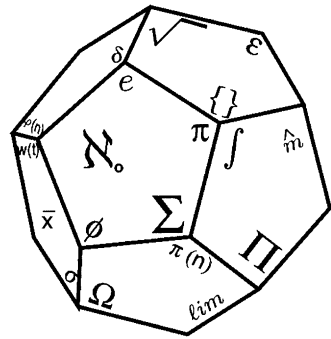
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Gábor J. Székely
Editor

Contests in Higher Mathematics

Miklós Schweitzer Competitions 1962–1991

With 39 Illustrations

Springer

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Preface

> *"I had the opportunity to speak with Leo Szilárd about the contests of the Mathematical and Physical Society, and about the fact that the winners of these contests turned out later to be almost identical with the set of mathematicians and physicists who became outstanding ... "*
>
> (J. Neumann, in a letter to L. Fejér, Berlin, Dec. 7, 1929)

The solutions to deep scientific problems rarely come to us easily. Thus, it is important to motivate students to begin efforts on these kinds of problems. Scientific competition has proved to be an effective stimulant toward intellectual efforts. Successful examples include the "Concours" for admission to the "Grandes Écoles" in France, and the "Mathematical Tripos" in Cambridge, England. At the turn of the century, mathematical contests helped Hungary become one of the strongholds of the mathematical world.

With the revolution in 1848 and the Compromise in 1867, Hungary broke free from many centuries of rule by the Turks and then the Hapsburgs, and became a nation on equal footing with her neighbor, Austria. By the end of the 19th century, Hungary entered a period of cultural and economic progress. In 1891, Baron Loránd Eötvös, an outstanding Hungarian physicist, founded the Mathematical and Physical Society. In turn, the Society founded two journals: the *Mathematical and Physical Journal* in 1892 and the *Mathematical Journal for Secondary Schools* in 1893. This latter journal offered a rich variety of elementary problems for high school students. One of the first editors of the journal, László Rátz, later became the teacher of John Neumann and Eugene Wigner (a Nobel prize winner in physics). In 1894, the Society introduced a mathematical competition for high school students. Among the winners there were Lipót Fejér, Alfréd Haar, Tódor Kármán, Marcel Riesz, Gábor Szegő, Tibor Radó, Ede Teller, and many others who became world-famous scientists.

The success of high school competitions led the Mathematical Society to found a college-level contest. The first contest of this kind was organized in 1949 and named after Miklós Schweitzer, a young mathematician who died in the Second World War. Schweitzer placed second in the High School Contest in 1941, but the statutes of the fascist regime of that time prevented his admission to college. Schweitzer Contest problems are proposed and selected by the most prominent Hungarian mathematicians. Thus,

Schweitzer problems reflect the interest of these mathematicians and some aspects of the mainstream of Hungarian mathematics. The universities of Budapest, Debrecen, and Szeged have alternately been designated by the Society Presidium to conduct the Schweitzer Contests. The jury is chosen by the mathematics departments of the universities in question from among the mathematicians working in the host city. The jury sends out requests to leading Hungarian mathematicians to submit problems suitable for the contest. The list of problems selected by the jury is posted on the bulletin boards of mathematics departments and of local branches of the Mathematical Society (copies are available to anyone interested). Students may use any materials available in libraries or in their homes to solve the contest problems. In ten days the solutions are due, with the student's name, faculty, course, year, and university or high school recorded on the solution set.

The Schweitzer competition is one of the most unique in the world. Winners of the contests have gone on to become world-class scientists. Thus, the Schweitzer Contests are of interest to both math historians and mathematicians of all ages. They serve as reflections of Hungarian mathematical trends and as starting points for many interesting research problems in mathematics. The Schweitzer problems between 1949 and 1961 were previously published under the title *Contests in Higher Mathematics, 1949–1961* (Akadémiai Kiadó, Budapest, 1968; Chapter 4 of this book summarizes the mathematical work of M. Schweitzer). Our book is a continuation of that volume.

We hope that this collection of Schweitzer problems will serve as a guide for many young mathematicians and math majors. The large variety of research-level problems may spark the interest of seasoned mathematicians and historians of mathematics.

I wish to close by acknowledging the outstanding work of Dr. Marianna Bolla as Managing Editor. In addition, without the constant assistance of Dr. Dezső Miklós as Technical Editor, we could not have this book.

Bowling Green, OH   *Gábor J. Székely*
August 26, 1995

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