Preface

For a long time, I (H. Dörrie) have considered it a necessary and appealing task to write a book of celebrated problems of elementary mathematics, their origins, and above all brief, clear and understandable solutions to them.

Only problems of elementary mathematics are considered since some readers have neither the time nor the opportunity to study mathematics at a higher level. Nevertheless, a colorful and captivating picture of the amazing variety of mathematical methods emerges, one that will, I hope, enchant many who are interested in mathematics and take pleasure in mathematical reasoning. The present work contains many pearls of mathematics from Gauss, Euler, Steiner and others.

Economic factors barred the publication of a larger work, and so a limit had to be set to the scope and number of problems treated. Thus, I decided on a round number of one hundred problems. Moreover, since many of the problems and solutions required considerable space, a number of mathematical miniatures were included. Possibly, however, it may be just these little problems, which are, in their way, true jewels of mathematical miniature work, that will find the most eager readers and win new admirers for the queen of the sciences.

As noted above, knowledge of calculus and analysis is not assumed. Consequently, the Taylor expansion is not used in deriving some important series. I hope nonetheless that the derivations given here, especially for the sine and cosine series, will please even mathematically sophisticated readers.

On the other hand, in some of the problems, e.g. Euler's tetrahedron problem and the problem about the distance between skew lines, the author believed it necessary to employ the simplest concepts of vector analysis. The advantages of brevity and elegance of vector methods are so obvious, and the time and effort for learning them so slight, that the vector methods presented here will surely encourage many readers to learn more about these methods.

For the rest, only the theorems of elementary mathematics are assumed to be known, so that reading the book will not entail significant difficulties. In this regard, the inclusion of the little problems may in fact increase the utility of the book, for it might lead weaker mathematical readers to tackle the more difficult problems after completing the simpler ones.

So then, let this book do its part to awaken and spread interest and pleasure in mathematical thought.

Wiesbaden Fall 1932 Heinrich Dörrie

Preface to the Second Edition

The second edition of the book contains few changes. Corrections have been made in the proof of the Fermat-Gauss Impossibility Theorem, Problem 94 has been placed in historical perspective, and the Problem of the Length of the Polar Night has been replaced by a problem of a higher level: "André's Derivation of the Secant and Tangent Series".

Wiesbaden Spring 1940 Heinrich Dörrie

Comments on Antin's Translation

David Antin translated Dörrie's *Triumph der Mathematik* in 1965 from German into English, and this was published by Dover as *100 Great Problems of Elementary Mathmatics*, *Their History and Solution*. A lot of things have changed since 1965. For example, terminology has changed, people are not as knowledgeable about some areas of mathematics (especially geometry) as they once were, but more knowledgeable about others (e.g. calculus).

I have owned a copy of Dörrie's *100 Great Problems of Elementary Mathmatics*, *Their History and Solution* since the mid 1960s, and have always been impressed with the problems included in it. I was unfortunately many times confused by the language and presentation. In some cases, words and phrases were mistranslated, in other cases, there was insufficient background about some topics to make the problems understandable. This is regretable, since many of these problems are jewels of mathematics, and I fear that many readers might have had similar difficulties in approaching this book.

I was fortunate enough to be able to devote a large part of a sabbatical in Winter and Spring 2010 to rework many of the problems from Dörrie's book. A straightforward translation would not necessarily shed more light on the problems in this book. What was required was in some cases more (or less) mathematical background, current terminolgy and notation to bring *Triumph der Mathematik* into the twenty first century. There are some problems, such as the nautical and astronomical problems, that seem somewhat dated today, and would probably not be included in a 2010 edition of the book. There are some other shortcomings in Dörrie (and Antin's translation), where he appears to assume (not always but sometimes) that a statement and its converse are equivalent; the word "converse" is also not used consistently; sometimes it means the "dual" of a statment (in projective geometry); sometimes as in No. 68, "Inhalt" is translated as "area", which might be correct in some contexts, but here it means "volume". In my reworking of the book, I have tried to maintain the flavor of Dörrie, and his goal of accessibility to a general reader.

Washington, PA Summer 2010 Michael Woltermann MWoltermann@washjeff.edu