# Preface

As I was walking along the benches one of my students asked if I didn't have an interesting problem or puzzle for him to solve. The course was the first and for most of them the only math course they would take in their vocational education. Their goal should be to become chefs, waiters, bakers, confectioners or something to do with food. For many of them math or school was not on the top of their agenda, they were pleased just to pass the course.

I on the other hand had always had a passion for mathematics and physics. I once competed in the International Mathematics Olympiad, IMO and was quite introvert, very quiet and to make any sort of contact was a challenge. This was not a big problem in high school or undergraduate studies, solitary studies suited me fine. It did not work so well for postgraduate studies though but I never longed for an academic career or writing research articles. After some years and a bit of personal development I became a high school teacher.

I have some things in common with both of the male characters in a recent movie $x+y$ where an introvert child prodigy makes it to the IMO with the help of a high school teacher, an academic drop-out that once took part in the competition himself. In the movie there is of course a love theme. When I participated in IMO in Paris each national team got a French guide. I fell in love with our guide and we became very good friends.

This was a time when popular science books about quantum mechanics, relativity and particle physics started to appear in the book shops. This was very inspirational reading and probably had some effect on me when I chose to study physics at the university. At times when I do not teach in high school I like to take courses at the university or work on some silly idea that has entered my head. Some of these projects can be seen at the website www.PMprojects.net. Reading about and doing math and physics have given me so much and writing this book will be a way for me to give something back.

The class mentioned in the beginning was working on percentage and related stuff, essential for everyday life but not the most interesting part of the course from a mathematical perspective. The problem I came up with

there and then was a bit contrived and removed from practical use but it turned out to be quite an amusing problem that would lead on to many interesting aspects of mathematics. After expanding the problem and dressing it up in a story it was a good exercise to present for the whole class. The answer to the problem was so unexpected and impressive that even students that had not shown the slightest interest in anything I had said before were amazed.

My time at the vocational school was coming to an end. I had replaced a teacher on sick-leave for an operation. After that I would have time and this would be my next big project, to write a book about mathematics.

The world of mathematics is like a big and beautiful landscape with many different regions with their own characteristics and beauty. Centuries of mathematical work has revealed many new fields and intricate and surprising connections between seemingly unrelated areas. The school exercise presented in the introductory chapter will serve as an entry point and its exploration will guide us through this landscape. Each chapter will contain a new field of mathematics with a more or less clear connection to our original problem.

Where we start and the route chosen is not important, hence the title of the book, *Mathemaical Wanderings*. The subtitle "*From the simple to the more advanced*" does not imply a linear progression; neither is the book a chronological story of mathematical evolution even though I will try to put mathematical ideas into a historic perspective. The subtitle simply reflects the obvious fact: to understand something advanced you must work your way up by first understanding something simpler.

This book can be read in different ways. My original aim was to write for the talented student in high school or college with a keen interest in mathematics, to inspire and show what lies beyond the current curriculum. This means that mathematical language with technical notation, formulas and equations will not be avoided as is often the case in popular books on science. The book also includes explorative mathematics, illustrated with pieces of Mathematica code and graphics. Programming by the way is how you can bring mathematical understanding to practical use and possibly make some money out of it.

Mathematics is not easy; it takes hard work and devotion to become good at it. Doing exercises is a central part of this work, a work that can bring you moments of great satisfaction and joy. Exercises are included to give the reader a chance to experience this. Hints are included in the end of the book.

I would also like to write for a more general audience with a broader perspective and show that mathematics is not an island. The book includes special sections with historical context, evolution of ideas, biographies of mathematicians and applications of mathematics in science and society. It is okay to skim equations and formulas if you do not have the time or inclination for this. Just seeing them can give you a better understanding of the nature of mathematics. You do not need to know the physics behind a rainbow to appreciate its beauty. But knowing does not make it any less beautiful, quite the contrary.

It might be argued that this book is written for another time, a time when all the knowledge of the world was not a few keystrokes away. The information is out there for anyone to find. All I have done is to gather some of that information together and put it into a book.

By writing this book I have had the opportunity to explore the fascinating world of mathematics and my hope is that you will be a fellow traveler and share some of that fascination with me.

*August 2015* *P. M.*