Preface to the corrected printing

Some two years ago the idea arose for a second (corrected) printing of my book *Formal Groups and Applications*, Academic Press, 1978. The initiative originated with the American Mathematical Society in the person of Sergei Gelfand.

Naturally the plan was to include an update chapter, outlining what had happened since 1978. I readily agreed to that, thinking that not all that much had happened (except as regards interrelations of formal groups with algebraic topology) and that some 100 pages would suffice for an update chapter.

I was vastly mistaken in my estimates. Meanwhile, I have collected well over 2400 relevant papers in published or preprint form and to do even marginal justice to all this material requires a second volume of *Formal Groups and Applications* comparable in size to the first one. That second volume, also to be published by the American Mathematical Society, is now in the process of being written. Currently it looks like the manuscript will be ready in the spring of 2013.

Meanwhile, here is a corrected printing of the original volume from 1978, complete with some three pages worth of corrections and a few short addenda. None of the corrections is very serious and all of the misprints involved can easily be corrected by the (attentive) reader. Still it is probably worthwhile having them listed.

There is little hope that I have really caught all misprints; so I will be grateful for the signaling of additional misprints on the part of generous readers.

The original edition of *Formal Groups and Applications* has been out of print for many years now and seems to be not always easy to get hold of even via university libraries. So I hope and trust that this corrected printing will be useful.

Michiel Hazewinkel
Bussum, 18 June 2012

PREFACE

This is a book on formal groups from the naïve or power series point of view. That is, it is really about formal group *laws*.

The theory of formal groups has found a number of rather spectacular applications in recent years in number theory, arithmetical algebraic geometry, algebraic geometry, and algebraic topology, ranging from congruences for the coefficients of modular forms and local class field theory to extraordinary K-theories and (indirectly) results on the homotopy groups of spheres.

Originally I intended to try to organize in the form of a coherent set of lecture notes those parts of the theory of formal groups leading up to the various applications and those parts which seemed to me to be in imminent danger of becoming applicable. It was Eilenberg who suggested casually over a glass of grappa in Udine, that, in that case, I had better try to make a proper job of it. To him, many thanks.

The result is, I hope, a book, which, starting from no more than a reasonable acquaintance with the more elementary facts concerning commutative rings and modules, takes the reader through most of the known results on formal groups and which also presents those applications which do not require too much extra apparatus.

This last restriction caused, inevitably, a number of casualties. Notably, the applications to algebraic geometry (abelian varieties), which are only present in the form of some brief, mainly bibliographical, notes.

Quite a number of people helped directly or indirectly in making this book possible (e.g., by inviting me to lecture on parts of it). To all of them also many thanks. Special thanks are due to Marijke, Maarten, and Annette (they know what for) and to my secretary, Hannie Oosthout, who did a splendid job of typing on the basis of a set of notes which were a perfect mess of addenda, corrections, and emendations, so that, at times, the script ran in three distinct yet intersecting directions.

The computer calculations which briefly occur in the introduction were done by Ir. G. J. v.d. Steen of our department of Automatische Informatie Verwerking.

MICHIEL HAZEWINKEL, Krimpen a/d Yssel, January 1977