

Preface

This work was originally conceived of as a consideration of difference equations, with the view of investigating the topics which are well-known in theoretical physics in connection with differential equations, among them methods for the solution of first and second order equations, asymptotic solutions, Green's function, generating functions, integral transforms, Sturm–Liouville theory, and the classical functions of mathematical physics. The two subjects, difference equations and differential equations, are generally treated separately, with only a brief reference to the similarity of the respective analyses. However, as the investigation of difference equations proceeded, not only did the similarity become more and more evident but it seemed to provide a good way to make difference equations more understandable to those of us for whom differential equations are familiar tools of the trade. In presenting a given topic, the attempt has therefore been made, whenever possible, to follow the analysis for differential equations by the analogous analysis for difference equations.

It is obvious to anyone familiar with this subject that many topics have not been considered here. It was not our intention to write an encyclopedia and hence choices had to be made. Among the topics omitted are nonlinear differential and difference equations, partial differential and difference equations in two or more variables, and chaos theory.



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