ADDIS ABABA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS

A GRADUATE SEMINAR REPORT
ON

CONFORMAL MAPPINGS AND THE RIEMANN MAPPING THEOREM

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TABLE OF CONTENTS

Contents — Page

Preface

It is easy to point out that any function of a complex-variable can be considered as a mapping from one complex plane into another. A great deal of attention is devoted to the study of holomorphic functions. The reason for this is that many problems from the theory of holomorphic functions can be solved according to the following procedures;

1. Solve the problem for the simplest possible type of domain;
2. Express the desired solution in terms of the one already found with the aid of a mapping.

A non-constant holomorphic function $w = f(z)$ maps a domain Ω of the $z-plane$ onto another domain $f(z)$ of the $w-plane$.At points where $f^{'}(z) \neq 0$ such a map has the remarkable property that it is conformal. This means that any two smooth curves intersecting in Ω map into curves which intersect at the same angle in $f(\Omega)$.By means of conformal mapping, problems of fluid flow, electrostatics and other fields can be mapped into simpler problems of the same general sort in $f(\Omega)$.Solution of the problem in $f(\Omega)$ then solves the original problem in Ω.Conformal mapping also gives geometrical insight into analytic(holomorphic) questions. This seminar paper includes definitions and basic properties of holomorphic functions ,conformal mappings(the bilinear transformations, The Schwarz-Christoffel transformation),Normal Families, the Riemann Mapping Theorem, which characterizes those domains that can be mapped conformally onto the unit open disk and concludes with one of the consequences of the Riemann mapping theorem.