

## Abstract

The aim of this project is to study (co)homology of groups and some of its applications. Group cohomology is an interesting theory as it provides a beautiful link between algebra and topology. Cohomology of groups are invariants of group and have applications in various areas of mathematics. Group cohomology can be defined using various constructions. In this project, we will be studying two of them. We will study group cohomology using cochain complexes. The other description of group cohomology which we will study is via projective resolutions. Besides this, for discrete groups we will also study homology of groups as homology of some topological spaces known as classifying spaces. We will compute cohomology of cyclic groups. We will also study interpretation of group cohomology in lower dimensions such as  $H_0(G, A)$ ,  $H_1(G, A)$ ,  $H_2(G, A)$  and  $H_3(G, A)$ . As an application of cohomology of groups, we will survey a paper of C. Wells, where a fundamental exact sequence relating automorphism group of an extension and cohomology of groups is derived. As an another application of cohomology of groups, we will obtain necessary conditions on cohomology of finite groups acting freely on spheres.