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Group Actions in Complex Geometry

In mathematical studies of geometric objects it is often useful to consider their symmetries. The more symmetries an object possesses, the better description of the object one can hope to obtain. A classical example is the study of regular polyhedra, where a large number of specific symmetries (such as tetrahedral, pyritohedral, icosahedral, octahedral, etc.) have been employed in order to understand the polyhedra's geometry. In modern mathematics, symmetries are combined in *groups* and the particular way in which a group of symmetries moves points within a geometric object is called the *action* of the group on the object.

The specific geometric objects that this project concerns are called *smooth manifolds*. Manifolds are used to model curved spaces; for example, the universe is represented as a smooth manifold in modern physics studies. Groups considered in this project are both groups in the usual algebraic sense and smooth manifolds. Such groups are called *Lie groups*. Students will study actions of such groups on special kinds of manifolds, *complex manifolds*. This is a modern way to study the symmetries of geometric objects, in this particular case, complex-geometric ones.

In this project several areas of modern mathematics come together: complex analysis in several variables, complex geometry, differential geometry, and Lie group theory.