Abstract

The Lefschetz Principle,
Fixed Point Theory, and Index Theory

This is a rough historical account of some uses of the Lefschetz Principal in fixed point theory and index theory. The Lefschetz Principal states that the alternating sum of the traces on cohomology (a global and rigid invariant) is equal to the alternating sum of the traces on the underlying cochain complex (a local and far less rigid invariant). The original Lefschetz Theorem for compact polyhedra then follows easily. The Lefschetz Principal extends readily to index theory and general fixed point theory on compact manifolds, where it is more commonly known as the heat equation method. We outline the proofs of the Atiyah-Singer Index Theorem and the Atiyah-Bott Fixed Point Theorem using this method.