

MST 352/652

Term Paper: Fredholm Alternative and Self Adjoint Operators

Due Date: May 06, 2019

The goal of this term paper is to understand how the Fredholm alternative can be applied to linear differential operators to deduce the existence and uniqueness of solutions to boundary value problems. To extend the Fredholm alternative to infinite dimensions the notion of the adjoint of an operator must be extended to differential operators.

Your term paper should give a recap of the section(s) you read from the text as well as the solutions to the required problems. Some of the key concepts are given below as well as the relevant sections from the text and homework problems.

1. **Textbook Sections:** pg. 340: Adjoints, pg. 350: The Fredholm Alternative, pg. 353: Self-Adjoint and Positive Definite Linear Functions
2. **Key Concepts:** Adjoint, differential operators, boundary conditions, higher dimensional operators, Fredholm alternative, self adjoint, positive definiteness, two dimensional boundary value problems.
3. **Problems:** #9.1.6, #9.1.8, #9.1.9, #9.1.11, #9.1.12, #9.1.21, #9.1.22, #9.1.24-9.1.26, #9.2.9, #9.2.13, #9.2.15.