Public Abstract

First Name:Kristin

Middle Name:Nancy

Last Name:Judd

Adviser's First Name:Dorina

Adviser's Last Name:Mitrea

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SP 2008

Department:Mathematics

Degree:MS

Title:An Extension of Green's Theorem with Application

The main result of this thesis is a generalization of Green's Theorem. Green's Theorem states: *If Omega is an open subset of R^2 containing a compact subset K with smooth boundary. Let P and Q be two real-valued functions on Omega which are differentiable with continuous partial derivatives. Then the integral over the boundary of K of Pdx + Qdy is equal to the double integral over K of a package of partial derivatives (namely the partial derivative of Q with respect to x minus the partial derivative of P with respect to y).* In this thesis we prove that the conditions on P and Q can be weakened. In fact, we prove that the conclusion of Green's Theorem holds if P and Q are only differentiable on a neighborhood of K and the package of partial derivatives is continuous on K.

After proving the main result we can conclude two further results, a generalization of the Divergence Theorem in R^2 and a generalization of Cauchy's Integral Formula.