

Thesis Defense: Jingbin Yin

Date: Monday April 13, 2009

Time: 2pm

Location: room 8-205

Committee: Richard Stanley, thesis advisor
Ira Gessel (Brandeis)
Alex Postnikov

A q -analogue of Spanning Trees: Nilpotent Transformations over Finite Fields

Abstract:

The main result of this work is a q -analogue relationship between nilpotent transformations and spanning trees. For example, nilpotent endomorphisms on an n -dimensional vector space over \mathbb{F}_q is a q -analogue of rooted spanning trees of the complete graph K_n . This relationship is based on two similar bijective proofs to calculate the number of spanning trees and nilpotent transformations, respectively.

We also discuss more details about this bijection in the cases of complete graphs, complete bipartite graphs, and cycles. It gives some refinements of the q -analogue relationship. As a corollary, we find the total number of nilpotent transformations with some restrictions on Jordan block sizes.