Queen's Algebraic Geometry
— Seminar —

Nonnegative Polynomials and Sums of Squares

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Abstract

A multivariate real polynomial p is nonnegative if $p(x)$ is at least 0 for all x in $\mathbb{R}^n$. I will start with a general introduction, reviewing the history and motivation behind the problem of representing nonnegative polynomials as sums of squares. Such representations are of interest for both theoretical and practical computational reasons. I will explain that the difference between nonnegative polynomials and sums of squares comes from Gorenstein ideals with special structure, which I will call positive Gorenstein ideals. Although the problem of nonnegative polynomials and sums of squares retains real flavor, this makes it amenable to tools from complex algebraic geometry and commutative algebra. As an example, I will discuss a surprising connection between the algebraic boundary of the cone of sums of squares and K3 surfaces.

Monday 17 October 2011
16:30 – 17:30
319 Jeffery Hall