# Robert Connelly (Cornell)

# Comments on Generalized Heron Polynomials and Robbins' Conjectures

## Abstract for the Combinatorics Seminar 2004 March 29

In High School we learn Heron's formula for the area of a triangle in terms of the lengths of its three sides. Less well known is a very similar formula, due to Brahmagupta, for the area of a cyclic quadrilateral in terms of the lengths of its four sides. (A polygon is cyclic if its vertices lie on a circle.) In both cases the square of 4 times the area is a polynomial of the square in the lengths of its edges. David Robbins showed that for any cyclic polygon with n edges the square of 4 times its area satisfies a polynomial whose coefficients are themselves polynomials in the edge lengths, and he calculated this polynomial for n = 5 and n = 6. He conjectured the the degree of this polynomial for all n, and recently Igor Pak and Maksym Fedorchuk have shown that this conjecture of Robbins is true. We have no comments about that proof. But Robbins also conjectured that his polynomial is monic, and that is what will be shown, along with comments about a proof of this and related results in a paper by Varfolomeev.