Gröbner Bases and the Ideal Membership Problem

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Abstract: Gröbner bases are powerful modern computational tools used to solve the ideal membership problem. This has applications in algebraic geometry, robotics, and graph theory. In this talk, we introduce the theory of Gröbner bases. Along the way, we introduce an algorithm for multivariable long division by generalizing the familiar polynomial long division in one variable. We demonstrate an algorithm to compute Gröbner bases, and we subsequently show how they help us solve the ideal membership problem.

Prerequisites: Some experience with polynomials in several variables and a basic understanding of polynomial long division.

References