Abstract

The fundamental theorem of algebra tells us the number of roots of a polynomial. As a generalization, Bezout's theorem tells us the number of intersection points between two arbitrary polynomial curves in a plane. The aim of this text is to develop some of the theory of algebraic geometry and prove Bezout's theorem. First, after some initial definitions and propositions we will prove the classical result of Hilbert's nullstellensatz, which describes the relationship between algebraic sets and ideals of a polynomial ring. From that we continue on to define the projective space, to which we extend our previous definitions of algebraic sets and ideals. Also needed for Bezout's theorem is the notion of intersection number, which is a generalization of counting zeros with multiplicities. The properties expected of the intersection number are given and we show that there is only one number which satisfies those properties. Then we have all the theory needed and we will prove Bezout's theorem.

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