Algebraic Geometry

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1 Varieties

Definition 1.1. Let K be an algebraic closed field. The *affine n-space* $\mathbb{A}_K^n$ is a set $\{(a_1, \dots, a_n) \mid a_i \in K\}$. An element $P \in \mathbb{A}_K^n$ is called a *point*, if $P = (a_1, \dots, a_n)$, each a_i is called a *coordinate* of P.

Remark. We will write $\mathbb{A}^n$ for $\mathbb{A}_K^n$.

Let $A = K[x_1, \dots, x_n]$ be a polynomial ring, A is a function such that for all $f \in A$ and $P = (a_1, \dots, a_n) \in \mathbb{A}^n$, $f(P) = f(a_1, \dots, a_n)$, which substitues x_i by a_i.

Definition 1.2. Let K be an algebraic closed field and $A = K[x_1, \dots, x_n]$. Let $T \subset A$, the *zero set* of T is the set $Z(T) = \{P \in \mathbb{A}^n \mid f \in A \text{ and } f(P) = 0\}$.

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