RESOLUTIONS OF SINGULARITIES.

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04. definition of singularities

DEFINITION 4.1. An subvariety $V = V$ of an affine space $\mathbb{A}^N$ of codimension k is non-singular at its point P if V is locally defined by k polynomials $f_1, \ldots, f_k$ such that $df_1, \ldots df_k$ is linearly independent at P.

The dimension and codimensions are defined by using the transcendence degree of the extension of the function field $k(V) = Q(k[V])$. The definition of regularity (singularity) is more naturally defined by using theory of commutative algebras.