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Proofs by several examples and stable combinatorial Nullstellensätze

The numerical Nullstellensatz (M. 2019) states in an explicit and practical manner that a polynomial vanishes on a non-empty irreducible variety if and only if it almost vanishes on a sufficiently generic point close to the variety. This yields the foundation of a valid proof by example method for algebraic statements. In this talk we present various extensions thereof based on a conceptual notion of when a set of examples is sufficiently generic. Besides theoretical and algorithmic criteria for sufficient genericity, we obtain several new types of Nullstellensätze in the spirit of the combinatorial Nullstellensatz and the Schwartz-Zippel lemma, also for varieties.