Some basic properties of primary decomposition

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Abstract

Assume R is a commutative Noetherian ring. If R be a UFD (Unique Factorization Domain), then every (non-zero) element is a product of powers of distinct primes. When $R = \mathbb{Z}$ for example, we have $12 = 3 \cdot 4 = 3 \cdot (2^2)$; in terms of ideals, we have $(12) = (3) \cap (2^2)$. In general, the above factorizations are not available. However, every proper ideal I of R has a *primary decomposition*, in which I is expressed as an intersection of finitely many primary ideals (such as $(12) = (3) \cap (2^2)$ over $\mathbb{Z}$). More generally, one can study primary decompositions for modules. – In this talk, we go over some of the basic properties of primary decomposition. In particular, the compatibility, uniqueness, and linear growth properties will be discussed.

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