

Table of Contents

Chapter 0 Ring Theory Background

- 0.1 Prime Avoidance
- 0.2 Jacobson Radicals, Local Rings, and Other Miscellaneous Results
- 0.3 Nakayama's Lemma

Chapter 1 Primary Decomposition and Associated Primes

- 1.1 Primary Submodules and Ideals
- 1.2 Primary Decomposition
- 1.3 Associated Primes
- 1.4 Associated Primes and Localization
- 1.5 The Support of a Module
- 1.6 Artinian Rings

Chapter 2 Integral Extensions

- 2.1 Integral Elements
- 2.2 Integrality and Localization
- 2.3 Going Down

Chapter 3 Valuation Rings

- 3.1 Extension Theorems
- 3.2 Properties of Valuation Rings
- 3.3 Discrete Valuation Rings

Chapter 4 Completion

- 4.1 Graded Rings and Modules
- 4.2 Completion of a Module
- 4.3 The Krull Intersection Theorem

Chapter 5 Dimension Theory

- 5.1 The Calculus of Finite Differences
- 5.2 Hilbert and Hilbert-Samuel Polynomials
- 5.3 The Dimension Theorem
- 5.4 Consequences of the Dimension Theorem
- 5.5 Strengthening of Noether's Normalization Lemma
- 5.6 Properties of Affine k -Algebras

Chapter 6 Depth

- 6.1 Systems of Parameters
- 6.2 Regular Sequences

Chapter 7 Homological Methods

- 7.1 Homological Dimension: Projective and Global
- 7.2 Injective Dimension
- 7.3 Tor and Dimension
- 7.4 Application

Chapter 8 Regular Local Rings

- 8.1 Basic Definitions and Examples

Exercises

Solutions