4 Cyclic Codes

4.1 Informal Definition

4.2 The Algebra of Cyclic Codes

4.2.1 Rings

4.2.2 Fields

4.2.3 Subfields

This is misnumbered 4.2.1 in the notes.

4.2.4 Polynomial Algebra and Galois Fields

1. The Integer Ring $\mathcal{Z}$
2. Constructing finite fields from $\mathcal{Z}$
3. The Polynomial Ring
4. Finite Fields from Polynomial Rings
5. The Structure of GF(q)

4.3 Viewing Cyclic codes from Extension Fields: An Example

4.4 Cyclic Codes, Formally

4.4.1 Algebraic Description of Cyclic Codes

4.4.2 Generating Cyclic Codes

4.4.3 Parity Check Polynomial

4.4.4 Error Polynomial

4.5 Explicit Construction of Cyclic Codes

4.5.1 Finding a Generator Polynomial $g(X)$

4.5.2 Non-primitive Cyclic Codes

4.5.3 Summary: How to Describe any Cyclic Code

4.6 Matrix Description of Cyclic Codes

4.6.1 Formal Method

4.6.2 A Direct Method

4.6.3 The Dual Code