CMSC 656

Symbolic and Algebraic Processing Spring, 1991

Instructor: Howard E. Motteler

Time: TuTh 11:30–12:45

Texts: (1) Computer Algebra, by Davenport, Siret & Tournier

- (2) The Art of Computer Programming, Vol.2, by D. Knuth
- (3) (Recommended) Macsyma Reference Manual

Course Outline:

- 1. Introduction to Macsyma: examples and applications (DS&T Ch. 1, Pavell&Wang, handouts)
- 2. Rational Arithmetic (Knuth section 4.5)

Fractions

Greatest common divisor

Factoring and primality testing

3. Polynomial Arithmetic (Knuth section 4.6, DS&T chapter 4)

Unique factorization domains

Polynomial division

Greatest common divisor

Factoring polynomials

- 4. Manipulation of Power Series (Knuth section 4.7)
- 5. Data Representation (DS&T chapter 2)

Representing integers and fractions

Canonical and normal forms for polynomials

Polynomials in several variables

Algebraic functions

Matrices

6. Polynomial Simplification (DS&T chapter 3)

Rings and ideals

Standard (Gröbner) bases

Solving polynomial equations

Buchberger's Algorithm

7. Formal Integration (DS&T section 5.1)

Grading will be based on regular problem sets and a number of short projects in Macsyma or Mathmatica. There will be one assignment due approximately every two weeks.