Ma 777 Programming for Mathematicians

Time and place: 2 pm MWF, 347 Classroom Bldg.

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Hours: 10-12 MWF, or by appointment. You can reach me by email anytime.

Syllabus: The primary goal of this course is to develop and improve our programming skills in Maple and C++. The subject will be numerical analysis, because that is a convenient and interesting branch of mathematics. (and also, we can make use of a collection of Maple worksheets that I prepared last semester for another course in numerical analysis.) We will cycle our efforts between three subgoals:

(1) Learning to use the Maple language and its interactive programming environment to develop and test numerical algorithms in differentiation, root finding, optimization, quadrature, interpolation with polynomials, and differential equations. This is where we will start.

(2) Learning how to export Maple procedures to Ansi C, and how to compile and execute the routines using the Gnu compiler gcc.

(3) Learning to use gcc to compile programs written in C++. We will make use of a library of C++ routines for matrix and vector calculations developed by R. Pozo.

The act of achieving these goals will result in our learning the basics (and more) of the languages Maple and C++. We need textbooks and materials for this.

Textbooks and materials: There are two official textbooks: A small tutorial/reference manual for MapleV4, *Maple Leaves: A tutorial*, and a somewhat larger tutorial/reference manual for C++, *C++ Programming Language*, by Bjarne Stroustrup. These contain exhaustive (and sometimes exasperating) descriptions of the languages and provide hardcopy to peruse when your computer is not available.

There is also a lot of unofficial (i.e., free) material. One good document (a little bit outdated) on the Maple language is *Programming in Maple: the Basics*, by Michael Monagen. An excellent source on C++ is the set of lecture notes *C++ Programming for Scientists and Engineers*, a course given by K. Remington and R. Pozo.

The Gnu compiler gcc is available on the t-machines at school. If you have a machine running Windows 95 at home, you can use the new *Chisel 1.0*, which is available free.

Programming Assignments and Projects. There will be periodic programming assignments made in Maple and C++. There will be a Maple project at midterm and a Maple or C++ project at final time.