Computer assignments will be mixed in with the homework assignments. You can use the software of your choice. To work problems that require algebra calculations, Mathematica is often a good choice. There are versions of Mathematica for public use available at the Learning Resource Center (on sunfire1.ece.utexas.edu) and the Computation Center facilities (which includes UNIX systems). The following Mathematica packages are available with every version of Mathematica:

Algebra, Graphics, ProgrammingExamples
Calculus, LinearAlgebra, Statistics
DiscreteMath, Miscellaneous, Utilities
Examples, NumberTheory
Geometry, NumericalMath

For example, if you wanted to do symbolic summations, you can load the Algebra extensions in Mathematica:

```
Needs[ "Algebra'Master'" ]
```

Be sure that the single quote is a backquote (') here and not an apostrophe ('). Once loaded, a package does not have to be reloaded. To sum a^n for $n = 0, 1, \ldots \infty$, use

```
SymbolicSum[ a^i, {i, 0, Infinity} ]
```

which returns $1/(1 - a)$.

- Getting Started: http://ssc.utexas.edu/consulting/tutorials/mathematica/index.html
- Support: math@ssc.utexas.edu.
- Example tutorial as a Mathematica notebook:
http://ssc.utexas.edu/consulting/tutorials/mathematica/notebooks/tut.nb
- Web page: http://www.wolfram.com/

Mathematica is available in the Student Microcomputer Facility in room 212 of the Flawn Academic Center (FAC) on both Windows terminals and Unix terminals. Mathematica should also be available in the computer clusters in FAC 101B (also a classroom) and FAC 300.

Mathematica on Unix

Mathematica manipulates algebraic expressions. It also crunches numbers, performs arbitrary-precision calculations, and supports sound, 2-D/3-D graphics, and animation. Its programming language is similar to Lisp but has many C constructs. It comes with its own word processing notebook interface. Its syntax is a bit unusual in that Mathematica uses square brackets to denote function calls, e.g.

```
Cos[2*Pi]
```

which returns 1. Mathematica has many commands and operators that are similar to C such as $++$, $-$, $+=$, -=, and ==, e.g.

```
thesum = 0;
For[ i = 0, i < 100, i++, thesum += i ];
```

which sets `thesum` to the *integer* 4950. Lists, vectors, and sets are represented as

```
vec = {0, 1, 2, 3};
```

Matrices are simply lists of lists:

```
mat = {{0, 1}, {2, 3}};
```

defines the matrix $\begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}$. The following line would find the matrix C that is the inverse of the transpose of the product of the two matrices A and B:

```
C = Inverse[Transpose[A . B]]
```

Running Mathematica

On the Unix machines in the Learning Resource Center, Mathematica is installed in the directory /usr/local/packages/mathematica on brando. The Mathematica executable programs are installed in the /usr/local/bin directory, which should already be on your path. The X windows version of the notebook interface can be run by typing

```
mathematica
```

To evaluate expressions, hit SHIFT-RETURN. If you are not running X windows, then you should run the terminal (tty) interface by typing math. There is an Emacs interface accessible by typing `ESC-x load-library math.el` in Emacs. Use `ESC-x math` to start the Mathematica kernel. Use ESC-RETURN to evaluate commands.

Mathematica Documentation

The best on-line documentation about Mathematica is available from the function browser in the X windows notebook interface. The Unix manual pages, accessed by typing `man math` and `man mathematica`, only provide help about the different ways to start Mathematica. Mathematica manuals may be available for checkout in computer clusters in which Mathematica is installed.

Technical Support

Division of Statistics and Scientific Computing, math@ssc.utexas.edu.