# NUMERICAL ANALYSIS PROGRAMS IN MATLAB

**About the Program Disk**

This README file gives instructions to the MATLAB programs on the disk. These programs are designed to run on a minimally configured computer. Minimal hard disk space plus the MATLAB package are all that is really needed. All of the programs are given as ASCII files called M-files with the .m file extension. They can be altered using any editor or word processor that creates a standard ASCII file. These are commonly called a "Text Only" file. The M-files can be run from within MATLAB by entering their name without the .m extension, for example, as ALG021. The files should be placed in the MATLAB\BIN subdirectory of MATLAB.

Some of the programs require the input of large amounts of data or generate extensive output. To enable the programs to be run quickly and efficiently, the input data can be placed in data files and the data files read by the program. When the output is likely to be extensive, the programs have been constructed so that it is convenient to place the output directly into an output file. The program will prompt you for the form of the input or output you would like to use. For example, when running the program for Neville's method, ALGO31.m, using the defined data file ALGO31.DTA for the sample problem, you will first see a screen that states:

```
Choice of input method:
1.   Input entry by entry from the keyboard
2.   Input data from a text file
3.   Generate data using a function F
Choose 1,2, or 3 please
```

If you choose 1 you will need to enter all the data for the program from the keyboard, and any mistake in a data entry will require the program to be rerun. Choosing 2 will lead to the input data file ALG031.DTA. Choosing 3 will cause the program to prompt you for the input of the function F.

All M-files require the Symbolic Toolbox. If you do not have the Symbolic Toolbox available to MATLAB the command syms will not be recognized. This will prevent the use of the variables in the programs.

The MATLAB programs are contained in two subdirectories MATLAB\M1 for the older version of MATLAB and MATLAB\M2 for the newer versions of MATLAB.

The M-files in MATLAB\M2 work in MATLAB 5.3. There are two major differences in the code. In general, to allow a function to be part of the input to a program requires the use of the inline command. This requires statements such as

```
SS = input(' ');
C  = inline(SS,'x');
```

to define the function C(x). Sample input would be the string x^2 + cos(x) resulting in C(x) = x^2 + cos(x). This type of code occurs in all M-files involving functions of one, two or three variables. Functions which may have more than 3 variables are input as arrays of strings. In the new version of MATLAB the data structure called cells are required. Programs ALG057.M, ALG101.M, ALG102.M, ALG103.M and ALG104.M require the use of cells.

The M-files in MATLAB\M1 are for the older versions of MATLAB. The input of a function requires statements such as

```
SS = input(' ','s');
C  = inline(SS,'x');
```

Further, the use of cells is not required for Algorithms 5.7, 10.1, 10.2 10.3 and 10.4 in the older version.