Introduction To Symbolic Package: MAPLE

This unit tells us, how to

- recognize the MAPLE environment and basic MAPLE commands.
- use online MAPLE help.
- use MAPL Ecommands to simplify polynomials, such as factoring polynomial, expanding an expression, simplifying an expression, simplifying a rational expression and substituting in an expression.
- use MAPLE commands to view two-dimensional graph, domain and range and parametric equations.
- use MAPLE commands to simplify a matrix, vector entry arrangement, matrix operations, inverse and transpose of a matrix.
- use MAPLE as a calculator.

1.1 Introduction

In this introductory course, you will become familiar with and comfortable in the Maple environment. You will learn how to use **"context menus"** and **"palettes"** to perform powerful analysis and create high-impact graphics with only a minimal knowledge of commands. This course will give you the tools, you need to get started quickly, and a solid foundation upon which to build your future Maple explorations.

1.1.1 *Maple Environment*

MAPLE is a powerful mathematical software package. It can be used to obtain both symbolic and numerical solutions of problems in arithmetic, algebra, and calculus and to generate plots of the solutions it generates.

If you want to be able to use MAPLE to solve mathematical problems, start the program with commands and then carry out each step given in the subsequent sections.

Open Maple : If you are on EOS (a UNIX-based operating system at North Carolina State University), then:

- Log on to your EOS account.
- Bring up the application menu (point to an open space on the desktop and use the middle mouse button) and choose "Mathematics < Maple-(14)".

You should eventually see a large window headed by " Maple 14 or 11 or any " with a smaller window headed by Untitled (1)- [Server 1]." The smaller window is the worksheet. The MAPLE command prompt

[>

will show at the upper left of the worksheet by clicking "prompt symbol" on a toolsbar.

When you are finished with the MAPLE session, you will leave the program by selecting "Exit" under the "File " menu (upper left of the MAPLE toolsbar).

Saving Your Program

As with any other program application (word processing, spreadsheeting, etc), you should get in the habit of saving your work frequently, so if the system crashes you can recover most of what you did.

- Choose "Save as" under the "File" menu. Make "Tutorial1.mws" the name of your file.

This name should then appear at the top of your worksheet. As you work, frequently choose "Save" under the "File" menu or type CONTROL-S (hold down the CTRL key and type S) to save your recent work.

Getting Help

Go to the "Help" menu (it's at the top right of the MAPLE toolsbar) and select "Contents". You will see a number of topics in black lettering (What's New, "Mathematics," etc.) and " introduction " and "Worksheet Interface" in green lettering. You can click on any title with green letters to open that section of the Help file. For example,

- Click on "Introduction" and read through the examples to get your first look at what MAPLE does.
- When you are finished, click on the upper left corner of the "Intro" window and select "Close" to get rid of the window.

Printing

If you want to print your program, then:

- Select"Print" under the "File" menu, note the name of the file that will be created when you execute the print command.
- Go into your terminal window and issue the command to print the file required.

1.1.2 ➪ *MAPLE Commands*

A MAPLE command is a statement of a calculation followed by a semicolon (the result is displayed on the screen) or a colon (the result is stored but not displayed). Following are some commonds followed by the displayed results. Enter the commands on your worksheet and verify the given results. When you get to "Save the file," select "Save" under the "File" menu or type CTRL-S. For example,

```
> 14 + 15;
```

$$29 \qquad (1)$$

```
> 8^2 + 5·6 + 2;
```

$$96 \qquad (2)$$

```
> 3·(6 + 9);
```

$$45 \qquad (3)$$

CTRL-S

If you don't include a semicolon or colon at the end of a command, MAPLE will interpret the next command line as a continuation of the previous command.

Arithmetic Operations : The symbols +,-,*, /, and ^ (or **) denote addition, subtraction, multiplication, division, and exponential (4^2=4**2=4^2=16). When a string of operations are specified in a command, MAPLE first does exponentiations, then multiplications and divisions, then additions and subtractions. To change the order, use parentheses.

Editing Commands : If you make a mistake in a command (like forgetting a semicolon) or want to change a command, you can go back and edit the command with the cursor and mouse as you would a word-processor text.

Exact Arithmetic and Floating-Point Arithmetic: MAPLE calculates fractions (exact arithmetic) unless you specify that you want decimals (floating-point arithmetic) with the evalf function ("evalf" stands for "evaluate using floating-point arithmetic").

```
> 25/27 + 3/51;
```

$$\frac{452}{459} \quad (4)$$

```
> evalf(25/27 + 3/51, 3);
```

$$0.985 \quad (5)$$

CTRL-S

The argument 3 in the evalf command specifies the number of significant figures you want in the result. If you omit this command, you will get ten significant figures:

```
> evalf(25/27 + 3/51);
```

$$0.9847494553 \quad (6)$$

1.1.3 On-Line Help

You can get help with MAPLE syntax by using the HELP menu, as described previously. If you have a question about a particular command, you can quickly get help by typing a question mark followed by the name (no semicolon). For example,

```
> ?differentiation:
```

will open a window containing information about what the "differentiation" f function does and how to use it. Click on the little "Cross" box at the upper left of the window to close down the little window.

Enlistment of Variables: Use the colon-equal symbol (:=) to define variables-that is, to assign values to them. Once you have defined a variable, simply typing its name will show its value, and using the name in a formula will cause the value to be substituted. For example,