MATH.2720 Introduction to Programming with MATLAB
Variable Names and Script Files

A. Variable Names

Most calculations involve formulas containing variables, so we need to know how to name variables and assign values to them in MATLAB.

A MATLAB variable name consists of letters, numbers, and underscores. No other characters, including spaces, are allowed in a variable name. A name must begin with a letter and can be no longer than 63 characters long. MATLAB is case sensitive, meaning that an upper case letter and a lower case letter are considered different symbols.

MATLAB has some predefined variables, functions, and keywords. You should not use the name of any predefined variable, function, or keyword as a variable name. Predefined variables include `i, j, pi, ans, eps, inf,` and `NaN`. There are many predefined functions and keywords. To check whether a name you want to use corresponds to one of these predefined names, you can use the `exist` command. For example, if you were thinking of using the name `sin` as a variable name, you could type the command

```
exist sin
```

in the command window. The result would be 5, indicating that the name `sin` corresponds to a predefined variable, function, or keyword. If the output of the `exist` command is 0, then the name you entered does not correspond to a predefined variable, function, or keyword, and it is OK to use that variable name.

B. Assigning a Value to a Variable

The equal sign is used to assign a value to a variable. For example, the command

```
x=1
```

assigns the value 1 to the variable named `x`. The command

```
x=1;
```

will also assign the value 1 to the variable named `x`, but the value will not be displayed. Using the semicolon to suppress output display is useful when you are working with large arrays of numbers.

C. Script Files

A script file is a text file containing MATLAB commands. If you are going to carry out a computation several times with possibly different values for your variables, it is convenient to save your commands in a script file so you don't have to type them in every time you do the computation.

Names used for script files obey the same rules as variable names. The file extension of a script file is `.m`

To create a script file, click on `New` on the toolbar, then click on `Script`. An editor box will open up, and you can type the commands you want to execute. When you have typed in all the commands, save the file by clicking `Save` on the toolbar, then clicking `Save` or `Save As`, then typing in the name you want to use for the file.

To run the file (in other words, to execute all the commands in the file), click on the green `Run` arrow on the toolbar, or type the file name in the command window.

If your script file contains many commands whose purpose is not obvious, it is good practice to document your code using comments. In a script file, any text following a percent sign (`%`) is considered a comment and is not executed as a command.

For example, if you create a script file named pyth.m containing the commands

```
a = 3;
b = 4;  % a and b are the lengths of 2 legs of a right triangle
c = sqrt(a^2 + b^2)  % c is the length of the hypotenuse of the right triangle
```

and run the file, the variable `a` will be assigned the value 3, the variable `b` will be assigned the value 4, and the variable `c` will be assigned the value 5. The value of `c` will be displayed, but the values of `a` and `b` will not be displayed because the commands defining `a` and `b` end with a semicolon.

D. Practice Problems

1. Recall that $\log_b(x) = \dfrac{\ln(x)}{\ln(b)}$. Use this formula to calculate $\log_5(70)$.
2. Write a script file that assigns the value 30 to the variable `Celsius` and calculate the corresponding temperature in degrees Fahrenheit. Recall that $F = 32 + 9C/5$.
3. Write a script file that assigns the values 2 and $3\pi/4$ to the variables `r` and `theta` and calculate the Cartesian coordinates `x` and `y` of the point with polar coordinates $r = 2, \theta = 3\pi/4$. Recall that $x = r\cos(\theta)$ and $y = r\sin(\theta)$.
4. The number of ways of choosing r objects from a set of n distinct objects is given by $C(n, r) = \dfrac{n!}{r!(n-r)!}$. Write a script file that assigns the values 10 and 4 to n and r and then calculates $C(n, r)$.

Answers to Practice Problems

1. 2.6397
2. 86
3. $x = -1.4142,\ y = 1.4142$
4. 210