

Introduction to *Mathematica*

Creating Documents

Bob Bradshaw, Ohlone College

Mathematica can be used to create finished documents in either print or electronic formats. Text features include font, size and color selection. Electronic features include collapsible outlines export of web pages. In addition, *Mathematica* also has an extensive selection of styles sheets

■ Cell Groups

Notice the "]" symbols at the right side of each *Mathematica* document. These symbols indicate cell groups. If a sequence of *Mathematica* statements is within one cell group, all of the statements can be executed by hitting the `ENTER` key only once. To key multiple statements within a cell group, simply use the `RET` key between statements.

```
In[1]:= a = 3
        b = 3
        total = a + b
```

```
Out[1]= 3
```

```
Out[2]= 3
```

```
Out[3]= 6
```

■ Commands, Inert Commands and Text

Mathematica commands are in a different font than standard text. They are also preceded by "In[#]:" which refers to the line number of that statement. You can refer back to these line numbers.

```
In[4]:= In [ 3 ]
```

```
Out[4]= 6
```

```
In[5]:= Out [ 2 ]
```

```
Out[5]= 3
```

```
In[6]:= Out [ 4 ]
```

```
Out[6]= 6
```

To turn make a cell group a particular style, you can either make a selection from the `FORMAT`→`STYLE` menu or use keyboards commands, such as `CTRL` 7 (`CMD` 7 on a Mac) for text.

Inert commands can be inserted in the middle of text by typing `CTRL` 9 before and `CTRL` 0 after the desired command, thus putting something like x^2 in the middle of a line. However, doing so requires the use of the commands for this type of function. It is probably easier to use the palettes for this type of operation. $\int_0^2 x^2 dx$. You can also insert things like `ESC` wolf `ESC` to get $\frac{1}{x}$.

For more on formatting see section 1.10 and 3.10 in the online help files

To get out of a cell group, you can use the cursor keys or the mouse.

Formatting for Reading on a computer Screen

■ Sections

The cell grouping symbols have additional use, that of collapsing sections. Simply double-clicking on the "]" symbol will collapse or open a section. Notice that the symbol changes slightly to indicate that a section should be expanded to reveal what is inside.

■ HTML

Mathematica can export to other file types such as HTML, XML, and TEX through the use of the FILE→SAVE AS command. Doing so will now allow you to view your page in a web browser such as MS Internet Explorer.

You Try It!

Copy a word problem from a book (or make up one of your own) and solve the problem using *Mathematica*. Format the solution into a full description of how you solved the problem. Create a web page of your solution when you are finished. An example is given below.

The Triangle Problem by Charles Brown

The hypotenuse is two less than triple the length of the short side. The other leg of the triangle is three more than double the length of the short side. Find the lengths of the three sides of the triangle.

My Solution:

```
In[7]:= Middle = 2 Short + 3
Hypotenuse = 3 Short - 2
myequation = Short ^ 2 + Middle ^ 2 == Hypotenuse ^ 2
answer = Solve[myequation, Short]
```

```
Out[7]= 3 + 2 Short
```

```
Out[8]= -2 + 3 Short
```

```
Out[9]= Short2 + (3 + 2 Short)2 == (-2 + 3 Short)2
```

```
Out[10]= {{Short -> 1/2 (6 - sqrt(41))}, {Short -> 1/2 (6 + sqrt(41))}}
```

The exact answers are:

```
In[11]:= myshortside = Short /. answer[[2]]
mymiddleside = Middle /. answer[[2]]
myhypotenuse = Hypotenuse /. answer[[2]]
```

```
Out[11]= 1/2 (6 + sqrt(41))
```

```
Out[12]= 9 + sqrt(41)
```

```
Out[13]= -2 + 3/2 (6 + sqrt(41))
```

The approximate answers are:

```
In[14]:= N[myshortside]
N[mymiddleside]
N[myhypotenuse]
```

```
Out[14]= 6.20156
```

```
Out[15]= 15.4031
```

```
Out[16]= 16.6047
```