

Maple Tips and Tricks

Lab 0 Version

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1. **Pi and e.** Maple knows both of these constants, but it takes a little bit of doing to get them to show up like you want to. If applying *evalf* to an expression results in an answer still containing e or pi, then this was done incorrectly. In order to make it work, you need to use something called “Symbol Completion.” The process is as follows:
 - a. Type the letter(s) for the constant you want. That is, type “pi” or “e”.
 - b. Before hitting anything else, enter the Symbol Completion Menu.
 - i. On an Apple computer, this is done by pressing Escape (Esc).
 - ii. On a Windows machine, this is done by pressing Ctrl+Space.
 - c. Select your desired symbol from the list (it should be the first one). You can either click on it, or move the cursor down to it and hit Enter.
 - d. The symbol e or π will now be inserted in your Maple document, and will function correctly.

Other notes for e and pi. In some cases, it may be easier to use the exponential function to handle cases with e. For instance, the expression

$$e^{x^2}$$

can just be written as

$$\exp(x^2)$$

and will work correctly.

2. **Digits of Accuracy on *evalf*.** There are multiple ways to specify the number of digits desired from the *evalf* function.
 - a. The help menu suggests using a subscript. This can be obtained by looking through the bars on the left side of the screen to find the “Layout” tab. Expanding that reveals many icons to deal with formatting. The one we want is “A_i”. Replacing the A by *evalf* and the i by the number of digits, and following this by the desired expression will give the correct result.

$$\text{evalf}_{30}(\pi^2)$$

- b. The number of digits can instead be put in brackets:

$$\text{evalf}[30](\pi^2)$$

- c. Or it can be put after the argument of *evalf*.

$$\text{evalf}(\pi^2, 30)$$

All of these will provide the value of π^2 to 30 digits of accuracy. This includes the 9 in front of the decimal point, so you are actually only getting 29 digits after the decimal point.

3. **Ditto Operator, %.** This can be a tricky one. The % operator does ***not*** look at the line above it, grab the result, and plug it in. Instead, it looks for the most recent line of code that you executed, takes the result of that line, and plugs it in. This happens even if you deleted the most recently executed code. For example, say you have are trying to numerically evaluate the expression

$$(\sqrt{2} + 1)^{10} \tag{1}$$

And when you go to calculate this result, you accidentally type in

$$\text{eval}(\%) \tag{2}$$

To which Maple so helpfully returns

$$\text{eval}\left((\sqrt{2} + 1)^{10}\right) \tag{3}$$

Now, realizing your mistake, you go back and change *eval*t to *evalf*.

$$\text{evalf}(\%) \tag{4}$$

However, even though this *evalf* line is right below the desired expression to evaluate, Maple is going to plug in the most recently executed code to the % sign. So, instead of plugging (1) into (4), the most recently executed line of code was your incorrect (2). Thus, Maple is going to plug (3) into (4), resulting in a response identical to (3).

4. **Functions and Expressions.** There are two main ways to express the mathematical idea of functions in Maple, as expressions or as functions. Both can do the exact same thing, but go about it in different ways.

- a. Expressions are defined simply using the := assignment operator

$$f := \sin(x) + x^2$$

- In order to plug a number into an expression like this, you need to use the *subs* command, as outlined in the packet.
 - To differentiate expressions, you use the *diff* command.
- b. Functions are defined using both an `:=` operator and an arrow `->`, which is a hyphen/minus followed by a greater than sign.

$$fx := x \rightarrow \sin(x) + x^2$$

- In order to plug a number into these functions, you simply write $fx(a)$, where a is the number you want.
- These functions are differentiated with the *D* command.

5. **Worksheet and Document Mode.** Both of these modes work well for what you want to do. However, formatting and adding text is slightly different.
- For worksheet mode, all of the Maple lines must be preceded by a `[>`. In order to make one of these symbols if there isn't one, go to 'Insert' at the top of the screen, then 'Maple Input'. If you have one of these lines and want to type text, go to 'Insert' and 'Text'. The style of the text can be changed at the top of the Maple Window. When doing Maple Input, make sure the button at the top of the window is set to 'Math'. If it is not, then the code will not render correctly.
 - For document mode, you can switch between entering code and text by pressing F5. The text can be formatted in the same way. As long as you are in Math mode, the Maple Code should execute just fine.