
Math 211 Lab00 *Mathematica* Introduction

1. View the video [First 10 Minutes with Mathematica 8](#).
2. Open *Mathematica*.
3. Create a new notebook from the welcome screen.
4. Insert the title ***Mathematica: An Introduction***.
5. Insert a subtitle that contains your name.
6. Insert the section **Arithmetic**.
7. Calculate $100!$ (which is notation for $100 \cdot 99 \cdot 98 \cdots 2 \cdot 1$). Remember Shift-Enter to execute.
8. Save the notebook with a file name of the form Lab00_YourName.nb, and continue to save as you complete more exercises.
9. Calculate 2^{64} in three ways: 2^{64} , 2 [Ctrl-Shift-^] 64 , and using Palettes | Classroom Assistant | Calculator | Basic.
10. Calculate $\sin(\pi/3)$ and $\tan(\pi/2)$. Use the free form input by typing $=$ first, use the Classroom Assistant, and/or remember that *Mathematica* functions and constants start with an uppercase letter to make an educated guess for the proper command.
11. Calculate $\sqrt{338}$ and $\sqrt{338.0}$. Computation with exact numbers yields exact results. Computation with approximate numbers yields approximate results.
12. Calculate an approximation of π/e to 50 decimal places. Hint: Use Help | Documentation Center to search on “numerical approximation” and find an appropriate *Mathematica* function. Of course, you could also use free form entry.
13. Insert the section **Algebra**.
14. Solve $-30 + 19x + 110x^2 + 21x^3 = 0$. Hint: Use free form entry and check out all results by clicking on the plus icon.
15. Factor $-30 + 19x + 110x^2 + 21x^3$. Hint: See previous activity. Note that *Mathematica* can be overly generous with its response to a free form entry.
16. Solve $\cos(x) = x$. Hint: See previous activity.
17. Insert the section **Plots**.
18. Plot $y = 2x \sin(x^2) - x^2$. Note that with free form entry, *Mathematica* provides two plots with different domains to emphasize different features of the graph.
19. Plot $y = x^2$ and $y = \cos(x)$
20. Plot $y = 2 \sin(3x)$ on the domain $x \in [0, 2\pi]$. Eventually obtain a *Mathematica* command.
21. Insert a section **Manipulate**.
22. Manipulate the above plot by changing the 3 to **freq** which is allowed to vary from 1 to 6.
23. Manipulate the above plot by changing the 2 to **amp** which is allowed to vary from 0 to 3. Use the PlotRange option to keep the vertical scale fixed from -3 to 3 .
24. In *Mathematica*, the equals sign ($=$) means assignment.
25. Insert a section **Typesetting**.
26. Insert a plain text cell and type the following sentences:

The function $f(x) = \sin(\pi x^2)$ is mildly interesting. The function $g(x) = \begin{cases} \sqrt{x+2} & x \geq 0 \\ \frac{x}{x-3} & x < 0 \end{cases}$ is much more interesting.

Hints: To start a mathematical expression, use [Ctrl-Shift-)] or Insert | Typesetting | Start Inline Cell. To end the mathematical expression, use the right arrow key or mouse to move the cursor out from the expression. Special symbols, superscripts, and other constructs can be found in the Classroom Assistant under Typesetting.

27. Save your notebook one last time.

28. Upload your notebook file in Moodle within the link Lab00.

Other references of interest:

- Important Mathematica Syntax.nb illustrates the concepts of names, expression, equation, and function.
- <http://www.wolfram.com/broadcast/screencasts/handsonstart/> contains a sequence of eight short introductory videos totaling about 50 minutes. Topics covered include notebook structure, keyboard and mouse input, basic calculations, basic graphics, interactive models, data, and presentations.
- <http://www.wolfram.com/broadcast/screencasts/howtoentermathematicaltypesetting/> is a 21-minute complete introduction to mathematical typesetting.