

# Math 235: Calculus Lab

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Olin 234

Week 1

## What is Calculus Lab all about?

- ▶ How to use Maple to help us do mathematics.  
Maple is a “Computer Algebra System (CAS)”
- ▶ How to use  $\text{\LaTeX}$  to help us communicate mathematics.  
 $\text{\LaTeX}$  is a word processing program designed for mathematics.
- ▶ Gain experience giving a short oral presentation.  
“Beamer” gives us experience with creating slides for talks.
- ▶ A General Goal: Experience with Linux OS, work in groups.

*All of the software in class may be run from your home computer-  
More later.*

## How will the lab run?

- ▶ Each week, meet for 50 min (be on time!)  
Some group work.
- ▶ Expectation: Abt 2 hrs outside of class/week (avg).
- ▶ Help: Lab consultants staff lab in evening.
- ▶ Check the lab schedule (it will also be posted online).

Week	Date	Topic	% <i>Course</i>
1	Jan 21	Lab 1: Intro and Latex	6
2	Jan 28	Lab 2: Intro to Maple	6
3	Feb 04	Lab 3: Maple and Latex	8
4	Feb 11	Lab 4: Biorhythms	12 total
5	Feb 18	Lab 4, Continued	
6	Feb 25	Lab 5: Clairaut's Theorem	20
7	Mar 04	Lab 5, Continued.	
8	Mar 11	Lab 5, Finish up	
		Spring Break	
9	Apr 2	Lab 6, Surfaces and Curves	8
10	Apr 9	Lab 7, Ants on a Doughnut	20
11	Apr 16	Lab 7, cont.	
12	Apr 23	Lab 7, cont.	
13 – 14		Work on Presentations	20
			100

You'll upload solutions to CLEO dropbox. (Create a new folder for each Lab- Not sure? Ask!)

Oral Presentation for the last 3 weeks (20% overall)

Currently

- ▶ 1PM Section: Saturday, May 16th, 9-11AM
- ▶ 2:30PM Section: Thursday, May 14, 2-4PM

To start today, we should go through the handout and set up the desktop:

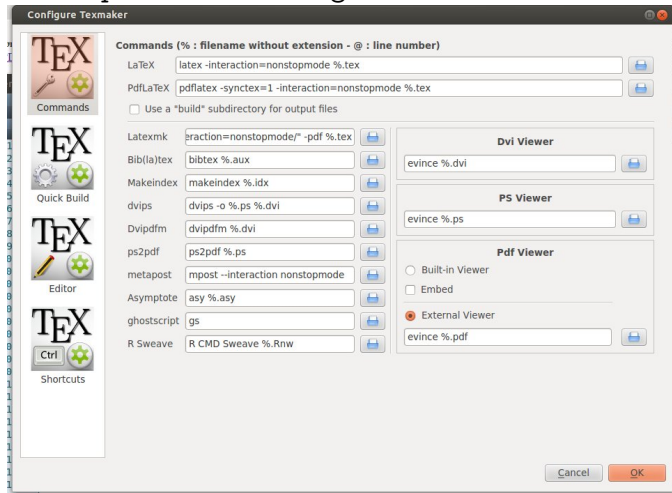
- ▶ Be able to log in and out.
- ▶ Change your password
- ▶ Modify the Launchpad (to include Terminal, Firefox, Maple, TeX-maker).
- ▶ You might also look at the operating system for a few minutes:
  - ▶ Dash Home (Button on upper left)
  - ▶ System Settings (Button on upper right)
  - ▶ Ubuntu Software Center
  - ▶ “Ubuntu One” is the cloud.

## Introduction to $\text{\LaTeX}$

- ▶ Not WYSIWYG
- ▶ Designed for mathematics; you type typesetting commands.
- ▶ Process for creating a LaTeX document:
  1. Use any text editor; typesetting commands and text saved as `filename.tex`
  2. Call the LaTeX software- Commands/text translated and `filename.dvi` is created.
  3. Translate the DVI file to PDF.
- ▶ We'll use TeX-Maker as our editor.

First, let's take a look at TeX-maker.

Go to Options -> Configure Texmaker







Commands



Quick Build



Editor



Shortcuts

## Quick Build Command

- ☐ LaTeX + dvips + View PS
- ☐ LaTeX + View DVI
- ☒ PdfLaTeX + View PDF
- ☐ LaTeX + dvipdfm + View PDF
- ☐ LaTeX + dvips + ps2pdf + View PDF
- ☐ LaTeX + Asymptote + LaTeX + dvips + View PS
- ☐ PdfLaTeX + Asymptote + PdfLaTeX + View Pdf
- ☐ LatexMk + View PDF

☐ User : (% : filename without extension)

`%x %aux|latex -interaction=nonstopmode %tex|latex -interaction=nonstopmode %tex|xdvi %dvi`

wizard

(the commands must be separated by '|')

☐ Don't launch a new instance of the viewer if the dvi/ps/pdf file is already opened

Cancel

OK



Now we'll put together our first document- Follow along from the handout.

What every LaTeX document needs:

```
\documentclass[12pt]{article}  
\usepackage{graphicx,fullpage}
```

```
\begin{document}
```

```
(text/typesetting here)
```

```
\end{document}
```

When saving a LaTeX document, be sure to end the file with `.tex`

From the class website, download the example PDF file, and copy/paste the text into TeXmaker.

We then want to:

1. Save the tex document as `Example.tex`
2. Press the arrow to the LEFT of "Quick Build".

```
\documentclass[12pt]{article}
\usepackage{graphicx,fullpage}
```

```
\begin{document}
```

You can see from the figure that the function  $y=\sin(x)$  is not one to one, but the function  $y=\sin(x)$ ,  $-\pi/2 \leq x \leq \pi/2$  is one to one.

Therefore, the inverse exists and is given by:

\$\$

$$\sin^{-1}(x)=y \iff \text{Leftrightarrow} \iff \sin(y)=x \iff \text{and} \iff -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

\$\$

```
\end{document}
```

All mathematical notation must be in “math mode”- Either inline or display.

► Inline: The text fits in one line. Example:  $\sum_{n=1}^5 x^n$

► Display: Larger font (summation, integral). Example: 
$$\sum_{n=1}^5 x^n$$

► You can force larger text in “inline” mode:

Try it:

`\frac{2}{x^2+1}` vs `\displaystyle \frac{2}{x^2+1}`

gives

$$\frac{2}{x^2+1} \text{ or } \frac{2}{x^2 + 1}$$

## Common Notational Issues:

- ▶ Big parentheses/delimiters:

\$\$

`\left[ \frac{2}{x^2+1} \right]`

\$\$

gives:

$$\left[ \frac{2}{x^2 + 1} \right]$$

- ▶ Example: Write the LaTeX code for

$$\cos\left(\frac{3x}{2}\right)$$

SOLUTION:

\$\$

`\cos\left(\frac{3x}{2}\right)`

\$\$

- Aligning things using an “array”. Here’s an example:

$$f(x) = \begin{cases} f_1(x) & \text{for } x < 1 \\ f_2(x) & \text{for } x \geq 1 \end{cases}$$

\$\$

f(x)=\left\{ \begin{array}{ll}

f\_1(x) & \text{for } x<1\\

f\_2(x) & \text{for } x\geq 1

\end{array}\right.

\$\$



Now continue working through the handout.

## HOMEWORK:

- ▶ Be sure to finish the handout.
- ▶ Watch the videos; linked from class website.
- ▶ Write a short biography of yourself (see details below).  
Upload the tex file and the pdf file to your dropbox before our next class meeting.

Write a short bio of yourself (just 1-2 paragraphs). Include things like where you are from and how much experience in mathematics you've had, and mathematical things that might be of interest.

You can also include hobbies.

Mainly, in this document I would like to see some structural things in LaTeX:

- ▶ Use title, author, date (and `\maketitle`).
- ▶ Include some mathematical notation, both inline and display.
- ▶ Save the tex file as: `bio.tex`.
- ▶ Use TeXmaker to create the appropriate PDF file, and upload both tex and PDF files to your CLEO dropbox before our next class meeting.