

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 \LaTeX to help us communicate mathematics.
 \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	Pts
1	Jan 17	HW Set 1 (Latex)	10
2	Jan 24	HW Set 2 (Latex/Maple)	10
3	Jan 31	HW Set 3 (Latex/Maple)	10
4	Feb 7	Start Lab 1	15

(Total points possible: 100)

How do you turn in solutions?

Upload solutions to CLEO dropbox. Be sure to create a new folder for each lab.

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

Currently scheduled for Friday, May 12th (More on this later)

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

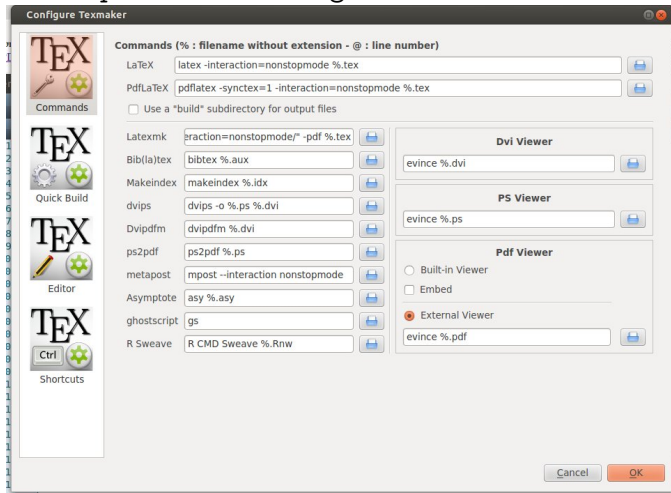
- ▶ Be able to log in and out.
- ▶ Change your password
- ▶ Modify the Launchpad (to include Terminal, Firefox, Maple, TeX-maker).
- ▶ You might also look at the operating system for a few minutes:
 - ▶ Dash Home (Button on upper left)
 - ▶ System Settings (Button on upper right)
 - ▶ Ubuntu Software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

Introduction to \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 + dvi2pdf + 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`

(the commands must be separated by '|')

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



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) & \mbox{ for } x<1 \\ f_2(x) & \mbox{ 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.