Introduction to Calculus Lab, Part I

Goals for the first part of class:

- Get into groups of 2 or 3 (introduce yourselves!)

- Brief notes about the syllabus.

- Be able to log in and out (and in again).

- Be able to change your password.

- Customize the desktop with icons for Maple, Firefox TeX-maker, and a shell window.

Log in and out

Log in using your usual Whitman login name, and your assigned password.

Be sure to log out after every session! You can either use the red button in the upper right corner of your desktop, or go to `System→Quit`

Change Your Password - Modify the Toolbar

First, we need a window in which we can type some commands. We will want to create an icon on our upper toolbar so this will be easy to access. From the upper left menu, choose the following, then drag the `Terminal` icon to your toolbar.

   `Application→Accessories→Terminal`

Left-click the icon we just put on the toolbar, and a window should open on your desktop (the name of your computer will appear). We will be using command lines to change the password:

Type: `kpasswd`

The first password asked for is your current password, then follow the instructions.

Be sure that you can log in using your new password- At this step, log out, then log back in.

Firefox, Maple and TeX-Maker

Find the desired icon under either `Applications` or `Actions`, then use the mouse to drag it to the toolbar:

- Use Firefox to get to our class website, and bookmark it (you can find it from the department website if needed):

   `http://www.whitman.edu/~hundledr/courses/M235.html`

- Find the Maple icon, and put it onto the toolbar. (We won't use the program until next week).

- Find the icon for TeX-Maker and put it on the toolbar. We will be working with this text editor today.

Ubuntu and Maple

Ubuntu uses some visual effects that can slow down the performance of the computer. To speed things up a bit, we can shut off some of the effects: Go to the Menu (top left) and select:

   System→Preferences→Appearance

Then select the `Visual Effects`, and set the visual effects to `None`

Introduction to Calculus Lab, Part II

Goals for the second part of class:

- Be able to navigate through your files (be able to create and remove file folders)

- Download files from the class website into the desired files.

- Understand the text editor interface.

- Familiarize yourself with the LaTeX manual (on each desk).

Notes on the computers and software

You are working on a computer that is using the Ubuntu version of Linux. This operating system is community developed and free of charge. If you would like to have Ubuntu on your Windows computer, it is easy to "dual boot" (Google wubi, which is an easy to use Ubuntu installer).

We will be using the LaTeX word processing software which is also community developed and free of charge. Links to this and the other software used in the lab are given on our class website.

Files and Folders

There are several ways of creating folders and navigating the directory structure in Ubuntu. You may use the *File Browser* which is very similar to Windows or Apple, or you may use a command line window using a *Shell*. Using the command line is very fast, but you need to know some Unix commands.

Use the *File Browser* to create a file folder called *Temp*, then be sure you can delete it (go ahead and delete). Next, create a folder called *MathLab*, and then create a subfolder called *Intro*.

HINT: Do not use whitespace in folder or file names!

These are BAD:

Math Lab   File 1.tex   my document.tex

These are GOOD:

MathLab   File01.tex   my_document.tex

What is LaTeX?

This is a free, community developed typesetting program designed for mathematics, and it produces professional looking documents- You may want to use it on your own computer. Other packages, like Microsoft Word, were not designed for mathematics and it is awkard to put alot of mathematics into a Word document. There are two steps to producing a LaTeX document:

- Type a text file, name it as `filename.tex`
  This file contains typesetting commands, text, and commands to produce mathematical symbols, equations, and you can include external graphs.

  IMPORTANT: Your final product will not look anything like what you see in the text document- you are typing command that the LaTeX program will use to create your document.

  HINT: You should actually type the `.tex` suffix.

- Compile the LaTeX code, and view the results.
  Run LaTeX to create your finished document (this will be the LaTeX button on TeXMaker). If successful, the program will output a file with a DVI suffix. You may view this file directly, or use TeXMaker (the lion button).

A First LaTeX document

- Open `TeXMaker`. Take a few moments to look it over. You will type in the main window, and you will use some of the buttons at the top to do the two steps we talked about.

- Start a new tex file: Go to `File -> New` (or the "New" button), then use the `Wizard` and choose `Quick Start`. Unfortunately the default is for European sized paper (change *A*4 to `letterpaper` and I like 12 pt font instead of 10 pt font; You may also change "Encoding" to "NONE"). Go ahead and include a title, like "Introduction to Lab".

  HINT: Once this is done once, it should save those changes.

- Before we proceed, take note that the following lines are NECESSARY for every latex file:

  ```
  \documentclass{article}
  \begin{document}

  \end{document}
  ```

  The option `article` may be changed to `amsart` or a different option (See some options in the Wizard dialogue box). The Wizard included some extra lines for some other fonts (we'll discuss them later).

- Now fill in some text between the begin/end document lines so that your document looks like this:

  ```
  \documentclass[12pt,letterpaper]{article}

  \usepackage{amsmath}
  \usepackage{amsfonts}
  \usepackage{amssymb}
  \author{ Your Names Here }
  \title{Introduction to Lab}
  \begin{document}
  \maketitle

  {\bf THE MEAN VALUE THEOREM.}  Let $f$ be a continuous function on the
  interval $[a,b]$, and differentiable on $(a,b)$.  Then there is a $c$
  in $(a,b)$ so that:
  $$
  f'(c)=\frac{f(b)-f(a)}{b-a}
  $$
  \end{document}
  ```

- Save this file as `MVT.tex`

  - To compile the tex file, press the button marked `LATEX`
  - To view the results, press the button marked with a lion (this is a DVI viewer).
  - Create a PDF document by pressing the `PDFLATEX` button, then check to make sure you can view it.

Notes and Questions:

- What happens if you delete the `\maketitle` command? (Try it)

- To create boldface text, we used: `{\bf text }`. Notice that these are *curly braces* and not parentheses.

- To set off mathematics variables and put them within a line of text, use single dollar signs: `$ math text $`

- To set off mathematics on its own line, use double dollar signs:

  `$$  math equation $$`

- What happens if you use `\[` and `\]` in place of the double dollar signs? (Try it)

- What happens if you replace `\[, \]` in the last item with `\begin{equation}` and `\end{equation}`? (Try it- You may have to press the LaTeX button a couple of times).

- A fraction was created by: `\frac{ numerator }{ denominator }`

- Regular text doesn't need anything special, unless you want it to be a title or something.

  We'll typeset some more, but first let's introduce an error so we can see what it looks like.

Finding and Fixing Errors

Put some white space here:

`\begin{equation}`

`f'(c)=\frac{f(b)-f(a)}{b-a}`
`\end{equation}`

and try to run LaTeX- You should see `Process exited with error(s)` in the Message Window.

Press the button with the green graph- This allows us to see what the LaTeX errors were- We see there is a problem with Line 15 (may be a different line on your document)- And this is the line at which we put the extra white space. Remove the white space and re-run, and the error should go away.

NOTE: Sometimes the error messages are a little cryptic, and may be entirely wrong. Usually they at least give you an idea of where to start