Math 290: LATEXSeminar Week 4

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List Environments

List Environments are useful when writing outlines, sets of numbered problems, and in documents with footnotes and/or reference points. For example:

1. An engineer thinks that his equations are an approximation to reality.
2. A physicist thinks reality is an approximation to his equations.
3. A mathematician doesn't care.

Or:

- Q: Why did the chicken cross the Moebius strip?
- A: To get to the other ... er, um ... nevermind!

Outline

Embedded HTML Links

- Open up an example document for this week. Add the normal preamble for a document.
- Next, add the package "hyperref" to the list of packages after the "usepackage" command.
- Now, try adding the following commands to the body of your example document:

  \htmladdnormallink{course webpage:}

  {http://www.mnstate.edu/jamesju/}

  [This should all be together on one line]
  Compile and see what happens.

Outline

Enumerate

The previous slide had examples that incorporated two types of list environments. The "enumerate" environment and the "itemize" environment.

We will begin by looking at the "Enumerate" environment.

The basic outline for a list in the enumerate environment is as follows:

```
\begin{enumerate}
\item
\end{enumerate}
```

An Example:

Practice typesetting the following list using the ennumerate command:

1. Captains
   1. Kirk
   2. Picard
      1. The best Captain?
   3. Janeway
2. First Officers
   1. Spock
      1. The best First Officer?
   2. Riker
   3. Chakotay

Notes:

You need 3 levels of "nested" enumerate commands for this example. The package used for these slides changes the standard enumerate package, so your results will look a little different.

Outline

Changing Counters

Suppose you want to create an outline for some course notes.
Typically, such notes are enumerated using roman numerals, followed
by capital letters, then small roman numerals, and then lowercase
letters.
The following commands will change the first counter to roman
numerals:

```
\begin{enumerate}
\renewcommand{\labelenumi}{\Roman{enumi}}
\item
\end{enumerate}
```

Try adding this command to your previous enumerated list.
Recompile and see what changes occur.

Changing Counters

To change the counters at depths 2, 3 and 4, use the commands

`\labelenumii, \labelenumiii, and \labelenumiv`

respectively.

The possible counters in the enumerate environment you may use:

- `\Roman`
  gives capital roman letters.
- `\roman`
  gives lowercase roman letters.
- `\Alph`
  gives capital letters.
- `\alph`
  gives lowercase letters
- `\arabic`
  gives arabic numerals

Outline

Itemized Lists

Itemized lists are just enumerated lists without "numerical" enumeration.

For example:

- What's a polar bear?

- A rectangular bear, whose coordinates have been changed!

The basic outline for an itemized list is:

```
\begin{itemize}
\item
\end{itemize}
```

Changing Bullets

To change the "bullets" in your list use the following command

`\renewcommand{\labeitemi}{whatever}`

The "whatever" is whatever you want your bullets to be.
Try exerimenting with a two level nested itemization after using the
following:

`\renewcommand{\labelitemi}{$\nabla$}`

`\renewcommand{\labelitemii}{$\heartsuit$}`

Outline

The Multicols Package

The multicols package is a package that allows you to create columns on your page without declaring your document to have two columns at the beginning.

In your preamble type

```
\usepackage{multicol}
```

Using Multicols

Try typesetting the following commands. Compile your document once you are finished.

```
\begin{enumerate}
\item $f(x)=e^{e^{e^x}}$
\item $g(x)=\sin x-\cos x$
\end{enumerate}
```

Next, modify your code as follows and then recompile.

```
\begin{enumerate}
\begin{multicols}{2}
\item $f(x)=e^{e^{e^x}}$
\item $g(x)=\sin x-\cos x$
\end{multicols}
\end{enumerate}
```

Using Multicols

- Next, add a few more functions to your list, and change it so that they are typeset using 3 coloumns.
- Add the functions $f(x) = \frac{1}{1+x^2}$, $g(x) = 6^x$, $h(x) = \sqrt[3]{x^2 - 1}$, $k(x) = 7$ to your list of functions.
- Then recompile and see what happens.

Outline

1. Embedded HTML Links

2. The Enumerate Command

3. Changing Counters

4. The Itemize Command

5. The Multicols Package

6. **Spacing Commands**

Space the Final Frontier

In your document after the last thing you typed before the end document command, type the following

    \newpage

We will play with spacing on a new page. Type the following into your page.

Dr. Goyt's Favorite Formula:

$$f(a) = \frac{1}{2\pi i} \oint_{\gamma} \frac{f(z)}{z - a} dz$$

An interesting function:

$$\phi(n) = n \prod_{p_i | n} \left(1 - \frac{1}{p_i} \right)$$

Vertical Space

The following commands allow you to create vertical space between objects on your page.

```
\vspace{xunits}
\vspace{\stretch{n}}
\bigskip
\medskip
\smallskip
```

Between the first two lines of your document, put a 1 inch space. Now try a 2 inch space.
Now separate the mathematical statements from the preceding phrases and put a stretching command between each. Choose whatever values you want for *n*, but make sure you make some of them different.

Horizontal Space

The commands for horizontal space are similar to those for vertical space.

```
\hspace{xunits}
\hspace{\stretch{1}}
\phantom{}
\hfill
\. thin
\; medium
\: thick
\! negative thin
\m width of an m
\n width of an n
~ space but no break
```

Spaced Out

Remove the vertical spacing on the page we were working with.

Now put the hfill command between the phrase and the mathematics on the first line. Build and see what happened.

Let's play with negative space for a minute. Notice that there is a lot of "padding" between the parentheses and the expression they contain in the second formula. Between the first parenthesis and the 1 put three thin negative space commands.

Finally, let's play with the phantom command. Put the phantom command in the first formula so that it contains the text following the $=$ to just after the integral.

What happens to your output?