Slide 1

Administrivia

- I had said one more significant homework then the project, but I forgot that I meant to split up one huge assignment into two:

  Homework 7, just posted, is about `gnuplot` and is fairly short. Due in a week.

  Homework 8, just posted, is about LaTeX and is, well, longer. Due in two weeks.

- Responses to minute-essay questions have been great! I want to reply to every one but have not had time. Soon maybe?

Slide 2

Basic LaTeX Features — Review/Recap

- Document class (`documentclass`) sets overall style of document, including margins, appearance of section headers, etc.
- Sectioning commands make (optionally) numbered sections, subsections, etc. `\tableofcontents` generates table of contents.
- Predefined macros provide simple markup, e.g., `\textit{foo}`.
- Environments provide support for lists, etc. One worth noting for CSCI types is `verbatim`, which typesets text as is in typewriter font. Simple way to get code in your program. (A "gotcha" — it doesn't expand tabs. Alternatives in sample document.)
- Math can be displayed inline, as centered and un-numbered equations, or as numbered equations.

Slide 3

Gotchas

- Some characters have special meaning and must be "escaped": backslash, brackets, #, %, $<$, $>$, $|$, caret (^), underscore (_), tilde (~).
- Quotation marks should be entered as, e.g., `` ``foo'' ``. A single minus sign is a hyphen; to get a dash use `--` ("en dash", suitable for connecting numbers, e.g., 1–100) or `---` ("em dash" — between words).
- Spaces after periods in the middle of a sentence should be followed by something to suppress intersentence space. I generally like just replacing the space with a non-breaking space `~`. (In fact I do this fairly often to avoid awkward line breaks.)

Slide 4

Basic LaTeX Features, Continued

- Lots of cross-referencing features — declare symbolic label (for section, figure, etc.) with `\label{foo}`, reference with `\ref{foo}`, or `\pageref{foo}` to get page number. (The computer keeps track of numbering! Isn't this how it ought to work?)
- Can use `\input` to pull in code from another file, like `#include` in C. Very useful for accessing your own macros. (I also use it quite a lot in preparing material for classes. A few years ago I got tired of copying and pasting text from one syllabus to another and refactored(?) to put common parts in a single place. Better?)

  `\verbatiminput` typesets included material verbatim. Simple way to include whole program listing.

Slide 5

"Floats"

- Figures and tables can "float" (LaTeX will put them where they fit). They also can be given labels.
- In my thinking this is how you should always include these elements, with a caption explaining anything that needs explaining (within reason) and a reference in the text such as "Figure `\ref{somefig}` illustrates this point." This avoids awkward page breaks and looks professional. Can be frustrating at first — "why did LaTeX position this as it did??" – but generally can get a reasonablle result with some tweaking.

Slide 6

Bibliographies

- Can sort of do by hand, but better is to use companion tool BibTeX:
- You write a `.bib` file that's a sort of database of references (meaning it can contain more entries than you will use for this document). Predefined types of entries, each with a list of keywords you must/may define (author, title, etc.). Also define for each entry a symbolic name.
- In your document, reference symbolic names with `\cite`. At the point where you want the bibliography, reference the database with `\bibliography`, and select a predefined style with `\bibliographystyle` (or you can write your own!). Everything automatic from there, including formatting. (Isn't this how it should be?)

  A "gotcha" — `bibtex` has its own ideas about capitalization. Sometimes this is bad, e.g., when you need all-caps in a title. Enclose in curly braces.

Slide 7

Tables and Graphics

- Support for tables with "tabular" environment. Something(?) of a pain to use but oh well (and would lend itself to being produced programmatically).
- Easy to include graphics from outside file. With traditional toolchain, must be in EPS (Encapsulated PostScript), but they scale nicely if you need that. `pdflatex` accepts input in various popular graphics formats. Not sure about scaling.
- Also there are packages for drawing figures directly.
- (A bit more shortly.)

Slide 8

User-Defined Markup

- Facilities to define your own "commands" and "environments". Makes it easy to get consistent formatting; also can provide convenient shorthand ways of doing things.
- To define a simple macro ("command"), `\newcommand`. Examples in sample document.
- To define a custom environment, `\newenvironment`.

Slide 9

Related Tools

- `gnuplot` integrates nicely with LaTeX.
- Many possible ways to draw figures, but I use `xfig` — old, but nice integration with LaTeX. (Also what it saves/loads is plain-text files.)
- Tools to convert LaTeX source to HTML. (I use `latex2html`; there are others.)
- Tools for editing LaTeX source. Support in both `emacs` and `vim` (`auctex` and `vimlatex` respectively). Also GUI frontends. See "Links" page.

Slide 10

Advice For Getting Started

- Get hold of an example that looks somewhat similar to what you want to produce, plus some sort of documentation — a guide from online or a book.
- Tinker with the example, putting in your prose and other stuff.
- When something doesn't work — I used to say "ask a local expert", and that should work, but these days a Web search may well turn up good suggestions.

Slide 11

Processing LaTeX

- On our machines, the latest version (probably the most complete) is "TeXLive". To access it,

  ```
  module load tex-latest
  ```

  (Put this in your `.bashrc` if you use it often.)
- Documents that include crossreferences and some other constructs need to be processed more than once (as with C, compilers aren't required to be very smart). Command `latexmk` automates that (re"compiles" as many times as needed).
- If you want to install on your machine, be advised that the above needs kind of a lot of disk space.

Slide 12

Minute Essay

- Questions? otherwise best wishes for a good weekend!