18.415/6.854 Advanced Algorithms	Fall 2001

Preparing Scribe Notes

Lecture notes must be prepared with LaTeX. LaTeX is a powerful typesetting software based on Donald Knuth's TeX, and is particularly useful for typesetting scientific texts. Learning LaTeX is easy: Start by editing a sample file, and learn new commands as you need them.

In this document, we explain some general guidelines for preparing the scribe notes; For specific LaTeX commands (e.g., typesetting of mathematical formulas, tables, etc.) you should consult the references.

1 The general structure of the file

Your LaTeX file should look something like this:

```
\documentclass{article}
\input{preamble.tex}
\begin{document}
\lecture{7}{September 10, 2001}{\mxg}{Your name}

The text of the lecture note comes here...

\end{document}
```

Use a text editor (e.g., emacs) to prepare the above file and save it as `scribe.tex`. To run LaTeX on this file, copy the file `preamble.tex` to your current directory. You can find this file in the course homepage. Then, use the command `latex scribe.tex` to run LaTeX on the above file, the command `xdvi scribe.dvi` to view the result, and `dvips scribe.dvi` to print.

The command `\lecture{7}{September 10, 2001}{\mxg}{Your name}` creates a header like the following at the top of the first page. You must provide the lecture number, the date of the lecture, and your name.

18.415/6.854 Advanced Algorithms		September 10, 2001
	Lecture 7	
Lecturer: Michel X. Goemans		*Scribe: Your name*

You should divide the lecture note into sections and possibly subsections, by using the LaTeX commands `\section{section name}` and `\subsection{subsection name}`. For example, the current section is typeset using the command `\section{The general structure of the file}`. Notice that the numbering of the sections and subsections is automatic.

2 Theorems, Lemmas, Definitions, etc.

Use the environment `theorem` to typeset theorems, as in the following example:

```
\begin{theorem}
There are no positive integers such that $x^n + y^n = z^n$ for $n>2$.
\end{theorem}
```

This command will produce the following output:

Theorem 1 *There are no positive integers such that* $x^n + y^n = z^n$ *for* $n > 2$.

Similarly, you can typeset lemmas, definitions, remarks, corollaries, propositions, claims, observations, and proofs by replacing the word `theorem` in the above example with the appropriate word. For proofs that do not come immediately after the theorem, you can use the environment `proof_of` as in the following example. The commands

```
\begin{proof_of}{Theorem 1}
I've found a remarkable proof of this fact, but there is not enough space
in this handout to write it.
\end{proof_of}
```

will produce:

Proof of Theorem 1: I've found a remarkable proof of this fact, but there is not enough space in this handout to write it. □

In the next section, you will see a better way to refer to Theorem 1.

3 Labeling and Referring

You can use the commands `\label{name}` and `\ref{name}` to refer to a theorem, section number, etc. For example, using

```
\begin{theorem}
\label{fourcolor}
Every planar map can be colored with four colors.
\end{theorem}
In 1976, Appel and Haken proved Theorem \ref{fourcolor}.
```

will produce

Theorem 2 *Every planar map can be colored with four colors.*

In 1976, Appel and Haken proved Theorem 2.

In this example, replacing the command `\ref{fourcolor}` with the number 2 will produce the exact same output. However, using `\ref{fourcolor}` has many advantages, for example, if the numbering of the theorems changes because of inserting a new theorem, `\label{name}` and `\ref{name}` will change everything automatically. Therefore, remember to *always* use `\label{name}` and `\ref{name}` for referring.

4 Figures

You can insert PostScript figures in a lecture note using the command
`\fig{label}{height}{caption}{filename.eps}`.
This command includes a figure that is stored in the file `filename.eps`. The parameter `height` specifies the height of the figure (the figure gets scaled according to this parameter), `caption` is the caption of the figure, and `label` is the name that you give to the figure for future reference using the command `\ref{label}`. Example: `\fig{f1}{2cm}{A graph}{graph.eps}`

You can draw pictures and save them as PostScript files using the software `xfig`.

5 Other useful commands

LaTeX has many nice commands that make typesetting much easier. For example, look up the references for the description of the math mode and math symbols, commands `\footnote` (for creating footnotes), `\cite` (for referring to an entry of the bibliography), `\it`, `\rm`, `\bf`, `\sf` (for changing the font), environments `itemize` (for unnumbered lists), `enumerate` (for numbered lists), `tabular` (for tables), `equation` (for numbered equations), and `thebibliography` (for adding a bibliography).

Also, for typesetting the symbols $\mathbb{R}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{C}$, and $\mathbb{N}$, use the commands `\Rea`, `\Int`, `\Rat`, `\Cmp`, and `\Nat` in the math mode.

6 References

MIT provides a document which introduces you to LaTeX. You can find this document on-line at `http://www.mit.edu/sipb/docs.html` or you may pick up a hard copy from the SIPB office W20-557. There are also many reference books for LaTeX. For example,

- *LaTeX : A Documentation Preparation System User's Guide and Reference Manual* by Leslie Lamport, Duane Bibby (Illustrator).
- *The Latex Companion*, by Michel Goossens, Frank Mittelbach, Alexander Samarin.

Also, you can use the following web-sites as a quick reference:

- `http://www.emerson.emory.edu/services/latex/latex2e/latex2e_toc.html`
- `http://www.giss.nasa.gov/latex/ltx-2.html`
- `http://www.fi.uib.no/Fysisk/Teori/KURS/WRK/TeX/symALL.html` (tables of LaTeX math symbols)