How to Use the `uscthesis.cls` Document Class

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0.1   Organizing Your Exposition for LaTeX

The `uscthesis.cls` documentclass is intended for the preparation of masters theses, doctoral dissertations, and honors theses submitted to the University of South Carolina.

The Graduate School and the Honors College have a number of requirements concerning the layout of these documents. The `uscthesis.cls` documentclass is intended to meet all these requirements. This should mean that as you prepare your dissertation or thesis, you will not have to concern yourself with such details, but rather focus your attention on the content and exposition of your work. However, from time to time the Graduate School and the Honors College may change or reinterpret their requirements. Please send email to mcnulty@math.sc.edu if it seems to you (or to either the Graduate School or the Honors College) that your output is not in accord with current requirements.

You must be sure that LaTeX is installed on your computer. There are several free and very good systems that can be downloaded from the internet. A full installation of LaTeX is quite large. A full installation is usually not needed, but you will probably need more than a basic installation. Your installation should at least include

the documentclass `memoir.cls` and, depending on how you build your bibliography, perhaps one of the packages `biblatex.sty` or `amsrefs.sty`. You may need other specialized packages to support graphics, special symbols, notational support for particular disciplines (like chemistry or linguistics), or to accomplish various typesetting tasks like endnotes or bibliographic layouts (e.g. as recommended by the American Psychological Association).

Once you have LaTeX available, you should create a directory on your computer which will contain all the work on your thesis or dissertation. Put a copy of `uscthesis.cls` in this directory. The `uscthesis.cls` documentclass is available from the Graduate School. You should make sure that the version you have is the latest one.

The documentclass works best if you put each section of your work in a separate file. You should give these files logical names. For example, if one of your sections concerns semidirect products, then you could create a file called `semidirectprod.tex`. It is not uncommon that in the course of writing you (or your advisor) might find it better to present the sections in a different order. Having them in separate files makes this easy. Also it makes it simple for you or your advisor to print out just the sections that are of current concern.

When you install LaTeX on your computer you will probably have the option to install at the same time a graphical user interface. Examples of such programs for the Windows operating system are TeXStudio, TeXworks, TeXmaker, Winshell, TeXnicCenter, winedt,.... The interface provides an editor for writing the files that will contain the substance of your work, as well as ways in which to invoke the various aspects of the LaTeX system. You can work without such an interface. In any case, the .tex files you create must be ordinary text files. For example, files created with Wordpad (part of the Windows operating system) will work fine, put files created using Microsoft WORD will not.

A typical thesis directory will contain many .tex files: one for each section of your work, for an abstract, for aknowledgments, for a dedication, and for your bibliography. Also there is one master file, typically called `main.tex`, which provides the overall LaTeX code for putting the whole thing together. As you procede with your writing, you will also find in this directory the files that LaTeX itself produces to keep track of various pieces of information it needs.

The `uscthesis.cls` documentclass is built on top of the `memoir.cls` documentclass. This means that the options and commands provided by `memoir.cls` are available for use with `uscthesis.cls`. However, some options, like those which change the prevailing font size or which alter the formatting of pages, can lead to output which no longer conforms to the dictates of the Graduate School or the Honors College. The `uscthesis.cls` documentclass also automatically loads the following LaTeX packages:

- `amsmath.sty`

- `amsthm.sty`

- `amsfonts`

- `amssymb.sty`

- `latexsym.sty`

- `array.sty`

- `ifthen.sty`

- `threeparttable.sty`

- `array.sty`

- `xcolor.sty`

- `xpatch.sty`

- `xparse.sty`

This makes all the commands and environments defined in these packages available to you.

A word of advice: LaTeX is not a what-you-see-is-what-you-get system like Microsoft WORD. Rather it aspires to deliver an output that is superior to what you can see instantly on your computer screen. For one thing, LaTeX needs to see somewhat more than one page worth of input to compute what the current page will look like. As you prepare your thesis or dissertation you will be actually inserting markup commands to obtain effects like **boldface** or to use characters like ℵ and æ or symbols like ∞ not found on your keyboard or to accomplish a wide assortment of other typesetting tasks. What you see on the screen is what you typed in at the keyboard, rather than the effect that will ultimately result. If your work is just ordinary text in English, with now and then a few effects like *italics*, it should not take you long to get use to LaTeX. You should not expect, of course, to be perfect when doing this markup. For instance the command `$\infty$` is used to produce ∞. If you type instead `$\intfy$` then LaTeX will not understand you. Fortunately, LaTeX has a pretty good system for reporting errors. It will tell you what the offending command was and on which line of your file the error occurs. **Here is the important bit of advice.** The lines in your file should be about 80 characters long. If the program you use to edit your files has a WRAP feature you should turn it OFF. Get use to hitting the ENTER key at the end of the line. Alaternatively, depending on the editor program, you might be able to set it for hard wrapping. Then when it automatically wraps, it will insert an end-of-line symbol (unreadable) at the correct place. In either case, this will let LaTeX's error messages get you to the trouble spots more quickly. It also has the advantage that if your files are processed on some other system—for instance that used by your advisor—then it is more easily handled.

A second word of advice: In order to make it convenient to be able to process your LaTeX files on different computers using different operating systems, it is advisable to chose filenames that do not involve blank spaces or characters other than letters and numerals. For instance, a filename like `My3Friends.tex` is likely to

be acceptable by all computer operating systems, whereas `My 3 Friends.tex` might be accepted on some operating systems but cause problems on some different system.

A third word of advice: Sometimes typesetting priorities and expository priorities conflict. In the preponderance of cases, the expository priorities should carry the day—after all the typesetting is suppose to support the exposition, not impede it. Nevertheless, here is some advice about how to make the more common compromises:

1. Choose the title of your work and the titles of your chapters, sections, and the captions on figures and tables as short as possible while still conveying the meanings you intend. A really long title, for example, will force crucial information (e.g. the name of the Dean of the Graduate School) off your title page and is unlikely to be acceptable to the Graduate School.

2. Use restraint with exotic symbols in your title. In particular, make the first thing in your title an actual word. This helps the folk like reference librarians and the designers of bibliographic data bases.

3. While LaTeX is really very good at page layout, now and then it is forced into embarrassment. For instance, there may be places where things stick out into the right margin. This doesn't happen often, but when it does the remedy is to rewrite a sentence or two. LaTeX will announce its embarrassment by issuing a warning about what it will call "an overfull \hbox." You should ignore these until you are polishing your final draft, since during the course of writing and rewriting these kinds of problems come and go.

An alert for veteran users of LaTeX: The `uscthesis.cls` documentclass is based on the `memoir.cls` documentclass. That class is designed to conform to the LaTeX3 guidelines. In particular, these guidelines recommend that some familiar LaTeX commands be phased out. This applies to the following font commands: \bf, \sc, \it, ... The font selection scheme in LaTeX is organized into font families, font series, and font shapes. Usually there are three font families:

- a typeface with serifs invoked by \rmfamily (replacing the phased out \rm);

- a typeface without serifs (that is, a sans serif typeface) invoked by \sffamily (replacing the phased out \sf);

- a monospaced typewriter font invoked by \ttfamily (replacing the phased out \tt).

The font series is a combination of the weight (boldness) and width of the characters in the font. The command \bfseries replaces the phased out command \bf and is used to invoke boldface. There is also the command \mdseries which invokes medium weight and medium width. The third font attribute is the font shape. Usually the following shapes are available:

- The default or upright shape. It can be invoked with \upshape;

- The *italic* shape can be invoked with \itshape (replacing the phased out \it);

- The Small Caps shape can be invoked with \scshape (replacing the phased out \sc);

- The *slanted* shape can be invoked with \slshape (replacing the phased out \sl).

0.2   The `main.tex` File

The first file you should prepare is the one that will coordinate the entire project. You are free to name this file anything you like, but its file extension should be .tex. Below I will assume that you have named it `main.tex`. (Other good choices are `frame.tex`, `mythesis.tex`, etc.). Here is a model of such a file. It is available from the Graduate School as `modelmain.tex`.

```
\documentclass{uscthesis}

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%% Options include: [forbinding], which produces
%%% an alternative title page and an appropriate
%%% binding margin, and [honors] for Honors College theses.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%  LaTeX Preamble
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\usepackage{graphicx}
\usepackage{tikz}
\usepackage{enumerate}

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% The packages above are only examples. You should include
%% any LaTeX packages that you need.  Most packages should work
%% with this documentclass. If you do not use the
%% packages in the example above, don't put these
%% lines in your file.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


\usepackage[style=uscauthoryear]{biblatex}
\bibliography{references}


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% The lines above specify a BibTeX style which controls
```

```
%% the appearance of the bibliography and how citations to
%% the bibliography within the text will work.  It is based on the biblatex.sty
%% package and provides a Chicago style, as preferred by the Graduate School.
%% There are other acceptable styles.  Indeed, different academic disciplines
%% have different styles.
%%
%% The line  \bibliography{references} will cause LaTeX is search for a file
%% called references.bib.  This file could be named differently.  For example
%% \bibliography{henry} would provoke a search for henry.bib.  The
%% file reference.bib (or henry.bib) is one you will have to produce.  It is
%% a BibTeX database of references you use.
%%
%% There are a number of alternate ways to address your bibliographic needs.
%% See uscthesisdoc.pdf  for a discussion of the different options.
%%
%%
%%
%%In any case, this  is a good spot to ask LaTeX to load what it needs to handle
%% literature citations and to layout the bibliography.
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\newcommand{\join}{\vee}
\newcommand{\meet}{\wedge}
\newcommand{\w}{\omega}
\newtheorem{thm}{Theorem}[chapter]
\newtheorem*{thmun}{Theorem}
\newtheorem{cor}[thm]{Corollary}
\newtheorem{lem}[thm]{Lemma}
\theoremstyle{definition}
\newtheorem{defn}[thm]{Definition}
\newtheorem{ex}[thm]{Example}
\theoremstyle{plain}

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%  Again, this is just a few sample lines. Put here any
%%  commands of your own devising that you want to use.
%%  If these examples are no use to you, omit them.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%              The Front Matter
%%  The section below deals with the material that comes
%%  before the actual content of the document: The title
```

```
%%  page, abstract, acknowledgments,etc.
%%
%%  Some of it is required.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\title{A Proof That Really Fits in the Margin}

\author{Isaac Leonard}{Gauss}     %% First Name then
                                   %% Last Name

\degreedate{2035}                        %% The year of graduation

%\degreemonth{December}                   %% Only for the honors option
                                   %% where it is REQUIRED

\otherdegrees{
Bachelor of Arts\\
Harvard College 2028\\ [3pt]
Master of Science\\
Savannah School of Design 2030\\ %% The \\ on this line is
}                                  %% ESSENTIAL!

\degreename{Doctor of Philosophy}    %% The Graduate School provides
                                   %% a list of official degrees.
\field{Mathematics}                %% Fields also provided by the
                                   %% Graduate School.
\college{College of Arts and Sciences}  %%As listed by Grad School

\advisor {Dr.}{David Hilbert}{Major Professor}  %%% Be sure the
\readera{Dr.}{Karl Gauss}{Committee Member}      %%% third field is
\readerb{Dr.}{Charles Parker}{Jazzman}           %%% the one used in
\readerc{Dr.}{George Washington}{Fourth Reader} %%% your department.
\readerd{Dr.}{Albert Camus}{External Examiner}
%%% If you have just two readers, for example, leave out \readerc and
%%% \readerd
%%%
%%% For Honors College theses use \reader{}{}   NO third field.
%%% The commands \otherdegrees, \degreename, \field, \college, \readera, etc.
%%% are not used under the honors option.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\dean{Plato}{Founder of the Academy}
 %% The Dean of Graduate Studies
                   %% For Honors College theses use
                   %% \schcsigner{}{}.  For example,
```

```
                              %% \schcsigner{}{Tayloe Harding, Interim Dean}


\copyrightpage          %% This is optional. It makes a
                        %% copyright page that will appear
                        %% immediately after the title page.


\abstract{herkimer}  %% This calls the file herkimer.tex but
                     %% but you might replace herkimer by
                     %% anything you like, for example by
                     %% abstract. Note, the Graduate School
                     %% REQUIRES that PhD dissertations have
                     %% abstracts.
                     %%
                     %% For Honors College theses use
                     %% \honorsabstract{}


%\summary{precis}       %% This command calls  precis.tex
                        %% It is only available with the honors
                        %% option and it is REQUIRED for Honors
                        %% theses.


\acknowledgments{thanks} %% This calls the file thanks.tex
%% This is optional        %% where you have put your
                           %%acknowledgments.


\dedication{dedication}   %% Calls dedication.tex
%%% Also optional


\preface{forward}     %% Calls forward.tex.  Optional.


\makeLoT                  %% Issue this command if your work has
                          %% four or more tables.  A list of tables
                          %% will be produced automatically.


\makeLoF                  %% works the same way but for figures.


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%  Finally, here is the meat.  The idea is to compose a
%%   .tex file for each section of your thesis or dissertation.
%%  Then use LaTeX's \include command to put them all together.
%%  Doing it this way makes it easier to change the order of
%%  exposition as your writing is in progress.  Also it
%%  makes it easy to print out just one section. The \include
%%  command always starts a new page. So every section would
%%  start on a new page.  If you would like for sections just
```

```
%%  to continue, after the appropriate vertical space, on the
%%  current page, then use the \input command instead of the
%%  \include command.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\begin{document}

\include{Introduction}    %% Calls Introduction.tex
                          %% Honors theses are required to
                          %% have an Introduction.  For
                          %% Honors theses, the file
                          %% Introduction.tex should begin
                          %%
                          %% \chapter*{Introduction}
                          %% followed by the text of the
                          %% introduction.


\include{Squares}         %% The three sections of Chapter 1
                          %% are in the files Squares.tex,
\input{Cubes}             %% Cubes.tex and Hypercubes.tex
\input{Hypercubes}

\include{1mod4}
\input{flying}
\input{joins}
\input{wattage}

\include{3mod4}           %% This chapter has 8 sections
\input{bigtime}           %% You should give your sections
\input{smalltime}         %% logical names, rather than
\input{roadmap}           %% numbers. As you write, you might
\input{overview}          %% decide to rearrange things.
\input{turnabout}         %% LaTeX can keep track of the
\input{fairplay}          %% numbering for you.
\input{roundup}

\include{rest}
\input{relax}
\input{grin}

%\include{Conclusion}     %% Honors theses are required to
                          %% have an unnumbered chapter
                          %% for conclusions.  The file
                          %% Conclusion.tex should begin
```

```
                        %%
                        %% \chapter*{Conclusion}
                        %% followed by the appropriate
                        %% text.


\printbibliography     %%  This is the command to use to
                       %%  insert the bibliography if you are using
                       %% the biblatex.sty package.


\appendix              %% Use this command if you have one
                       %% appendix. Use \appendices if you
                       %% have more than one.


\input{toolong}        %% Calls toolong.tex which contains
                       %% an appendix. After issuing the
                       %% command \Appendix or \Appendices
                       %% you must use \input not \include
                       %% to load the first appendix.


\end{document}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

As you see, the file `main.tex` has four parts:

1. The documentclass declaration.

2. The LaTeX preamble.

3. The frontmatter.

4. The operative part.

The options made available by `uscthesis.cls` are

`forbinding` Chose this option if you want a title page displaying the committee as a table and margins appropriate for making bound copies. This is not the format approved by the Graduate School. Nor is it acceptable by ProQuest, the company that archives theses and dissertatoins. Rather the option is intended for your personal use, and perhaps for the bound copy for your department, should your department require one. If you want to employ this option then the top line of your `main.tex` file should be

```
\documentclass[forbinding]{uscthesis}
```

Running LaTeX under this option will produce output suitable for binding. This option can be used or omitted with just a few keystrokes to change the main.tex file. No other changes are needed.

`honors`	Chose this option if you are writing an honors thesis for the South Carolina Honors College.
`durt`	Chose this option if you are writing a mathematics thesis for graudation with distinction in mathematics.

The LaTeX preamble should contain any usepackage commands has well as any LaTeX commands or environments of your own devising. If you have an extensive list of the latter, you should consider putting them in a separate file called something like `mymacros.sty` and then in the LaTeX preamble you can insert the line

```
\usepackage{mymacros}
```

to obtain the same effect.

The frontmatter portion of `main.tex` houses the information needed for that part of your work which comes before the body of the work. In particular, all the information that goes on the title page is part of the frontmatter. You don't have to worry about making the title page look right, but you have to provide the information that will be displayed. Also as part of the frontmatter, you will be asked to give the names of files that contain things like your abstract, dedication, acknowledgments, and preface. Some people make the following distinction between a preface and an introduction: a preface gives a brief account of the substance and structure of your work, whereas an introduction may be much more elaborate in its presentation of background material. So a preface has more substance than an abstract less than an introduction. In your thesis or dissertation, the preface comes before the Table of Contents, whereas an introduction is really the first chapter. You will need to create the corresponding files in your thesis directory. These files can be empty (at the start), but they must exist if you put their names in the frontmatter. In the frontmatter you can also specify whether you want a list of figures or a list of tables. The rule of thumb is that if your work has four or more figures (or four or more tables) then you should provide a list following the table of contents. These lists, as well as the table of contents will be built automatically by LaTeX.

Finally, the operative part of the `main.tex` file consists of those lines between the

```
\begin{document}
```

line and the

```
\end{document}
```

line. This part simply calls a sequence of files which contain the substance of your work. You can add, delete, and rearrange the lines in this part of `main.tex` as your writing procedes.

0.3 How to Prepare the Files Containing Sections of Your Work

Ordinarily, a thesis or dissertation is divided into several chapters, and each chapter is divided into sections. Introductions, and appendices (as well as the bibliography) are treated as chapters, but are not numbered as chapters. Here is how the file containing the introduction might begin:

```
\chapter*{Introduction}
```

```
The main concern of this thesis is to give a proof that
really fits in the margin.
```

The file `Squares.tex` containing the first section of a chapter might look like this:

```
\chapter{Geometry fits!}\label{chap:geom}
\section{Squares}\label{sec:squares}
Every square dances...
```

On the other hand, a file containing a later section of the same chapter would begin

```
\section{Hypercubes}\label{sec:hypercubes}
Hypercubes have more shadows ...
```

Finally, the file containing an appendix might begin

```
\chapter{Proofs too long for the margin}
Fermat may have had one, or maybe not.
```

We have a few more words about the bibliography below.

0.4 Preparing the Abstract, Acknowledgments, Dedication, and Preface

The Graduate School requires an abstract for doctoral dissertations and masters theses. The inclusion of acknowledgments, dedications, and prefaces is optional. If you choose to or are required to include any of these you must provide a file name in the frontmatter. For example,

```
\acknowledgments{thanks}
```

will cause LaTeX to search for and load the file `thanks.tex`. You must create the file `thanks.tex` in your thesis directory. In this file you should put just the text of what you want to say. The `uscthesis.cls` documentclass will put in the appropriate heading. If you don't want an acknowledgment, then simply omit the command. The other three commands work in a similar way.

0.5 Dealing with Tables and Figures

LaTeX provides two standard environments `table` and `figure` to handle the insertion of tables and figures. These are commonly called *floats*. Tables and figures tend to take up a lot of space on a page. Just like typesetters have for centuries, LaTeX reserves the right to place these on pages as it see fit. The problem is that the ideal place you might want is actually two-thirds down the page and there is not enough space left on the page to accommodate the table or figure. Rather than leaving a terrible looking empty space, LaTeX will continue to fill in text and place the figure or table at the top of the next page OR it might decide to recompute the current page and place the table or figure at the top. As you write and rewrite you won't know (and you shouldn't worry about it) how much space will be left. Let LaTeX figure it out. In polishing the final draft, you will have some chance to fix it if you don't like the result of the efforts of LaTeX. Once again, this is accomplished by rewrite or shifting text around to change the amount of vertical space available to LaTeX.

Here is an example of a table:

Table 0.1   The Comedies of Shakespeare

The Two Gentlemen of Verona	The Taming of the Shrew	The Comedy of Errors
Love's Labor Lost	A Midsummer Night's Dream	The Merchant of Venice
The Merry Wives of Windsor	Much Ado About Nothing	As You Like It
Twelfth Night	Troilus and Cressida	Measure for Measure
All's Well That Ends Well	Pericles Prince of Tyre	The Winter's Tale
Cymbeline	The Temptest	

The `table` environment and the `figure` environment allow you to use the `\caption` command. The Graduate School wants the captions of tables to appear at the tops of tables and the captions for figures at the bottoms of figures. This is achieved by issuing the caption command at the beginning of the `threeparttable` environment and at the end of the `threepartfigure` environment. The Graduate School discourages long captions and will allow only two sentences in any one caption.

Table 0.1 was produced by

```
\begin{table}[hbt]\centering\SingleSpacing
\begin{threeparttable}
\caption{The Comedies of Shakespeare}\label{comedies}
\newcolumntype{Y}{>{\small\raggedright\arraybackslash}X}
\begin{tabularx}{100mm}{|Y|Y|Y|}\hline
The Two Gentlemen of Verona&The Taming of the Shrew&
The Comedy of Errors\\
\hline
Love's Labor Lost&A Midsummer Night's Dream&
The Merchant of Venice\\
\hline
The Merry Wives of Windsor&Much Ado About Nothing&
As You Like It\\
\hline
Twelfth Night&Troilus and Cressida&
Measure for Measure\\
\hline
All's Well That Ends Well&Pericles Prince of Tyre&
The Winter's Tale\\
\hline
Cymbeline&The Temptest&\\
\hline
\end{tabularx}
\end{threeparttable}
\end{table}
```

To LaTeX veterans the `threeparttable` environment looks like extra work. Without it the caption would be centered. The Graduate School wants the caption to be flush left with the edge of the table and be no longer than the table is wide. This is what the `threeparttable` environment does. The environment `tabularx` allows us to specify the width of the table and how to format the contents of each cell in the table. The `tabular` environment is simpler and will serve most purposes.

Had the caption command been placed at the end of the `threeparttable` environment (just above the \end{threeparttable} command), then the caption would have been typeset at the bottom of the table. The `figure` environment is similar, but a bit more complicated, as we will see soon.

The label `\label{comedies}` is used to refer to the table. So elsewhere in the text you might have written

```
As we see from Table~\ref{comedies}, Shakespeare wrote
seventeen comedies.
```

which would be typeset as

As we see from Table 0.1, Shakespeare wrote seventeen comedies.

To set up a figure is only a bit more complicated than setting up a table, provided you have a figure handy. Figure 0.1 is an example.
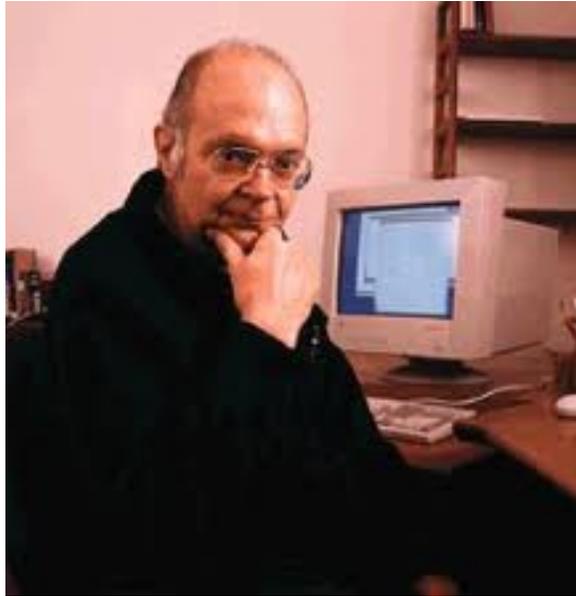

Figure 0.1   Donald Knuth, Creator of TEX

To include Figure 0.1 in this document, I used the following pieces of LATEX that I typed into my computer.

```
\begin{figure}[hbt]\centering\SingleSpacing
\begin{threepartfigure}
\begin{tabular}{c}
\includegraphics{knuth}
\end{tabular}
\caption{Donald Knuth, Creator of \TeX}\label{knuth}
\end{threepartfigure}
\end{figure}
```

The actual file with Donald Knuth's picture is called knuth.jpeg and is in the directory on my computer where the file for this document is also located.

Maybe you will want to make your own figures. LATEX, with the help of some style packages, has a lot of the facilities to support this. The package `tikz.sty` is particularly useful. Figure 0.2 found on page 16 was made with the help of this package.

The actual LATEX typing that has to be done to create Figure 0.2 might be a bit intimidating at first since it is essentially a set of instructions for drawing the diagram, but I include it here anway.
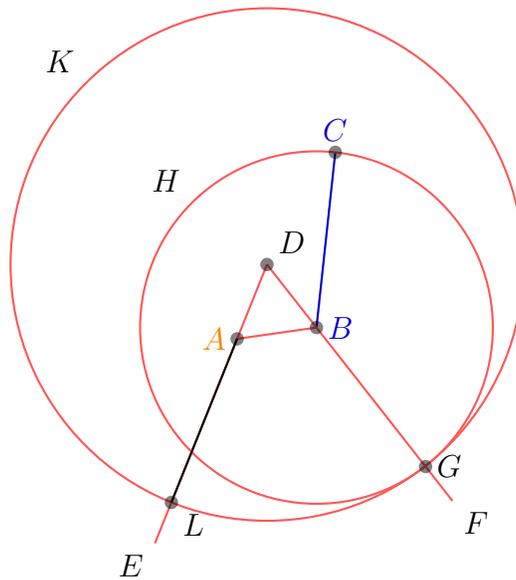
Figure 0.2   Euclid's Proposition II, Book I

```
\begin{figure}\centering\SingleSpacing
\begin{threepartfigure}
\begin{tabular}{c}
\begin{tikzpicture}
[thick,help lines/.style={thick,draw=red!66},scale=1.27]
\def\A{\textcolor{orange}{$A$}} \def\B{\textcolor{input}{$B$}}
\def\C{\textcolor{input}{$C$}} \def\D{$D$}
\def\E{$E$} \def\F{$F$}
\def\G{$G$} \def\H{$H$}
\def\K{$K$} \def\L{\textcolor{output}{$L$}}
\colorlet{input}{blue!80!black} \colorlet{output}{black}
\coordinate [label=left:\A] (A) at ($ (0,0) + .2*(rand,rand) $);
\coordinate [label=right:\B] (B) at ($ (1,0.2) + .2*(rand,rand) $);
\coordinate [label=above:\C] (C) at ($ (1,2) + .2*(rand,rand) $);
\draw [input] (B) -- (C);
\draw [help lines] (A) -- (B);
\coordinate [label=above right:\D] (D) at ($ (A)!.5!(B) !
{sin(60)*2} ! 90:(B) $);
\draw [help lines] (D) -- ($ (D)!3.75!(A) $)
coordinate [label=-135:\E] (E);
\draw [help lines] (D) -- ($ (D)!3.75!(B) $)
coordinate [label=-45:\F] (F);
\node (H) at (B) [help lines,circle through=(C),draw,label=135:\H] {};
```

16

```
\coordinate [label=right:\G] (G) at (intersection of B--F and H);
\node (K) at (D) [help lines,circle through=(G),draw,label=135:\K] {};
\coordinate [label=below right:\L] (L) at (intersection of A--E and K);
\draw [output] (A) -- (L);
\foreach \point in {A,B,C,D,G,L}
\fill [black,opacity=.5] (\point) circle (2pt);
\end{tikzpicture}
\end{tabular}
\caption{Euclid's Proposition~II, Book~I}\label{euclid}
\end{threepartfigure}
\end{figure}
```

There are many software packages that can produce graphical output and that have nothing particular to do with LaTeX. Most of these software packages offer ways to export their graphical output in a variety of formats—some even offer formats intended for LaTeX documents. Because your thesis or dissertation will have to be presented to the Graduate School as a pdf file, it is crucial that any graphics you export from a second program and then import into your dissertation (say with the \includegraphics command) be acceptable by the pdflatex processor. About the only common format the is unacceptable to pdflatex is Postscript (that is with file extensions like .ps or .eps). **There is also one other thing to keep in mind. Some outside graphics software packages will export graphics that have letters or numerals as labels. Sometimes these labels will be in fonts that turn out not to be embedded fonts. The Graduate School requires that in your final pdf file all fonts be embedded.** The notion of embedded fonts is technical. To find out whether your thesis has any, open it in Acrobat Reader, click of the file button (upper left)—then on the drop down menu select properities. In the window that opens click on the font tab. The list of fonts displayed should all have the remark "embedded subset". If some font does not, it has probably snook into your document via some imported graphics.

0.6   Making the Bibliography

Standard LaTeX provides an environment, `thebibliography`, which can be used to make your bibliography. This is a reasonable choice if your bibliography is very short.

On the other hand, a huge bibliographic database of mathematics is available online (MathSciNet from the American Mathematical Society). Databases for other disciplines may also be available. For example, the MLA bibliographic data base can export information in BibTeX format. It is possible to take advantage of such databases using either BibTeX or a version of the `amsrefs.sty` package modified to reflect the desires of the Graduate School.

There are basically two issues concerning bibliographic matters: the layout of the bibliography itself and how citations within the body of your work will refer to the bibliography. Each item in the bibliography will have a **citation key**. This citation key is used in the body of the work when referring to an item in the bibliography.

0.7   Using BibTEX

Using BibTEX in the Traditional Manner

If you are working in the mathematical or physical sciences, or in engineering, you could include in the LaTeX preamble of your `main.tex` file the line

```
\bibliographystyle{amsplain}
```

This invokes the `amsplain` style for laying out the bibliography, which is the style used by the American Mathematical Society—the world's largest publisher of mathematical research. Another alternative is to use the `plain` style in place of the `amsplain` style. (Many professional journals in these disciplines have developed bibliography layouts of their own.) The Graduate School expects references to be enumerated by author in alphabetical order. Both of the styles mentioned above do that. Both these styles provide the command \cite to use within the body of your work for making citations.

Almost the last thing in the template was the line

```
\include{biblio}
```

The file `biblio.tex` should contain a single line

```
\bibliography{\jobname}
```

Finally, you will need a file named `main.bib` (or `frame.bib` if you named your coordinating file `frame.tex` or . . .). This is the file that contains all the specific information that goes into your own bibliography. This file has a very structured appearance. Moreover, it is not really a LaTeX file. Fortunately, the entries in this file can mostly be downloaded and only need a bit of easy editing once you download them. Here is what a part of this file might look like:

```
@article {perkins69,
    AUTHOR = {Perkins, Peter},
     TITLE = {Bases for equational theories of semigroups},
   JOURNAL = {J. Algebra},
  FJOURNAL = {Journal of Algebra},
    VOLUME = {11},
      YEAR = {1969},
     PAGES = {298--314},
}
@incollection {shallonfb,
    AUTHOR = {McNulty, George F. and Shallon, Caroline R.},
     TITLE = {Inherently nonfinitely based finite algebras},
 BOOKTITLE = {Universal algebra and lattice theory (Puebla, 1982)},
    SERIES = {Lecture Notes in Math.},
    VOLUME = {1004},
     PAGES = {206--231},
```

```
  PUBLISHER = {Springer},
    ADDRESS = {Berlin},
       YEAR = {1983},
}
```

The corresponding entries on MathSciNet are

```
@article {MR0233911,
     AUTHOR = {Perkins, Peter},
      TITLE = {Bases for equational theories of semigroups},
    JOURNAL = {J. Algebra},
   FJOURNAL = {Journal of Algebra},
     VOLUME = {11},
       YEAR = {1969},
      PAGES = {298--314},
       ISSN = {0021-8693},
    MRCLASS = {20.93},
   MRNUMBER = {MR0233911 (38 \#2232)},
 MRREVIEWER = {T. Tamura},
}
@incollection {MR716184,
     AUTHOR = {McNulty, George F. and Shallon, Caroline R.},
      TITLE = {Inherently nonfinitely based finite algebras},
  BOOKTITLE = {Universal algebra and lattice theory (Puebla, 1982)},
     SERIES = {Lecture Notes in Math.},
     VOLUME = {1004},
      PAGES = {206--231},
  PUBLISHER = {Springer},
    ADDRESS = {Berlin},
       YEAR = {1983},
    MRCLASS = {08B15 (03C05 08B05)},
   MRNUMBER = {MR716184 (85h:08011)},
 MRREVIEWER = {Sheila Oates-Williams},
}
```

The chief difference between these two is in the key. The citation key is, in each entry, what lies between the first opening brace and the next comma. For the first reference this is "perkins69" while on MathSciNet it is "MR0233911". This last is the Mathematical Review number. My advice is to use keys that make sense to you. In this case the key "perkins69" recalls that this is a paper of Perkins published in 1969. It is these keys which you will use in the body of you thesis to refer to items in the bibliography.

So the process is to go to the MathSciNet webpage (either from within the Mathematics Department using our webpage or from the Thomas Cooper Library webpage). Get the items you need using MathSciNet's clipboard. Select the BibTeX format and

then save as a text file (not an html file). You will have to edit the result, removing stuff at the top and bottom as well as changing the keys to something more suitable.

There are many systems for making citations in the body of your dissertation. LaTeX itself provides the command \cite. If you write

```
In the old times Minkowski \cite{Henry} described manifolds...
```

then the output will look like

In the old times Minkowski [24] described manifolds...

Here, `Henry` is the citation key and LaTeX has calculated that Minkowski's paper occurs as the 24th item in the bibliography.

The author-date method of citation is also very common, particularly outside the technical disciplines. In fact, this is the method put forward in the Chicago Manual of Style that is preferred by the Graduate School. To use it you should put in the LaTeX preamble of your main file the following lines

```
\usepackage{natbib}
\bibliographystyle{plainnat}
\usepackage{uscnatbib}
```

replacing the \bibliography{amsplain} suggested above. You can also replace `plainnat` by `chicago`. This repositions the dates in each bibliographic reference. Both styles are acceptable in the Chicago Manual of Style. You will need to get `uscnatbib.sty` from the Graduate School. The package `natbib.sty` provides a number of commands to use when you want to make citations in the body of your thesis. The two main commands are \citet and \citep. The first is for use, mostly, when the citation is itself the subject of a sentence, while the second is used in a more parenthetical sense when the work cited is referred to.

```
In the old times \citet{Henry} described manifolds...
```

then the output will look like

In the old times Minkowski (1907) described manifolds...

Here LaTeX has figured out that the author with citation key `Henry` is Minkowski and that work cited was published in 1907.

```
In \citep{Henry} we find some interesting manifolds...
```

then the output will look like

In (Minkowski 1907) we find some interesting manifolds...

Here LaTeX has figured out that the author with citation key `Henry` is Minkowski and that work cited was published in 1907, but it displayed it differently in the text. To find out more about the other citation commands, look in the LaTeX Companion.

Using BibTeX with the `biblatex.sty` Package

The package `biblatex.sty` offers a simpler and more flexible way to interface with the BibTeX database than the traditional manner. It will probably become the preferred method in the reasonalbly near future.

In this method, you would include, in place of \bibliography{amsplain} in the LaTeX preamble of you `main.tex` file the lines

```
\usepackage[style=uscnumeric]{biblatex}
\bibliography{\jobname}
```

or the lines

```
\usepackage[style=uscauthoryear]{biblatex}
\bibliography{\jobname}
```

depending on whether you want your bibliography to be an enumerated list and the in-text citations to be numbers in brackets or to have the bibliography as a specially indented list and the in-text citations to mention author and year. The first is like the `plain` bibliography style in the traditional approach to BibTeX while the second conforms to the guidelines in the Chicago Manual of Style.

You will need to download from the Graduate School the files

```
uscnumeric.bbx and
uscnumber.cbx
```

to use the first alternative and the files

```
uscauthoryear.bbx and
uscauthoryear.cbx
```

for the second.

Almost the last thing in the template was the line

```
\include{biblio}
```

When using `biblatex.sty` the file `biblio.tex` should contain the following line

```
\printbibliography
```

There are a number of citation commands. The most commonly used are \cite and \textcite. Under the numeric option the first produces square brackets with the appropriate number, while the second prints the name of the author or editor followed by the appropriate number in square brackets. Under the authoryear option, the first command prints the author's name and year of publication, while the second command prints the author's name and then the year of publication in parentheses. A third command, \parencite, puts the authors name and the year of publication all inside parentheses. Adding an "s" to any of these commands, for example \textcites, allows the input of several citation keys. The command \fullcite places in the text

the essential bibliographic information itself. Finally, there are a number of command like \citeyear or \citeauthor which print the corresponding information when given the citation key.

Using the `uscamsrefs.sty` package

To use this method, you would include, replacing the \bibliographystyle{amsplain} command, in the LaTeX preamble of your `main.tex` file the line

\usepackage{uscamsrefs}

You will need to obatin a copy of `uscamsrefs.sty` from the Graduate School. It is a version of the `amsrefs.sty` package modified to produce a bibliography that meets to specifications of the Graduate School.

Finally, you will need a file named `main.ltb` (or `frame.ltb` if you named your coordinating file `frame.tex` or ...). This is the file that contains all the specific information that goes into your bibliography. This file has a very structured appearance. But this time, it is really a LaTeX file. Fortunately, the entries in this file can mostly be downloaded (at least for theses and dissertations in mathematics...) and only need a bit of editing once you download them. Here is what a part of this file might look like:

```
\bib{MR0233911}{article}{
    author={Perkins, Peter},
    title={Bases for equational theories of semigroups},
    journal={J. Algebra},
    volume={11},
    date={1969},
    pages={298--314},
    issn={0021-8693},
    review={\MR{0233911 (38 \#2232)}},
}

\bib{MR716184}{article}{
    author={McNulty, George F.},
    author={Shallon, Caroline R.},
    title={Inherently nonfinitely based finite algebras},
    conference={
        title={Universal algebra and lattice theory},
        address={Puebla},
        date={1982},
    },
    book={
        series={Lecture Notes in Math.},
        volume={1004},
```

```
        publisher={Springer},
        place={Berlin},
     },
     date={1983},
     pages={206--231},
     review={\MR{716184 (85h:08011)}},
}
```

This time the citation key is in the first set of braces following the \bib command. You should again change these keys to something understandable. For example, you could change the key of the first entry to Perkins1969.

An important difference between BibTeX and the amsrefs method is that BibTeX arranges things in alphabetical order automatically whereas the amsrefs constructs the bibliography in the order it appears in the .ltb file. This means that **you** must be sure that the .ltb file is ordered alphabetically to satisfy the Graduate School.

If you want to use an author-date system as described in the Chicago Manual of Style (the Graduate School's nonexclusive preference), then you should use that author-year option. You get this by slightly modifying a line in the `main.tex` file to obtain

```
\usepackage[author-year]{uscamsrefs}
```

This will ensure that your bibliography is typeset in the author-date fashion. It also gives you access to a few more citation commands. Here is an example of how to use some of them in the author-year system for citation.

```
In \cite{Perkins1969}, one finds a lot of interesting
observations. Peter Perkins \ycite{Perkins1969} proved
that every commutative semigroup is finitely based.
There were many related developments in the years
following, but \ocite{Perkins1969} led the way.
```

This bit of input would be typeset of LaTeX as

> In (Perkins 1969), one finds a lot of interesting observations. Peter Perkins (1969) proved that every commutative semigroup is finitely based. There were many related developments in the years following, but Perkins (1969) led the way.

If you want to learn more about the `amsrefs.sty` package and its additional commands, you should read the package documentation available online.

Whether you use BibTeX or the uscamsrefs method, you must first run LaTeX to make sure that all the citation keys from the body of your thesis are stored in the .aux files. After that you run BibTeX (if that's what you are using) or LaTeX (if you are using the amsrefs method). Then you have to run LaTeX a couple of more times

to resolve all the references. If you are using the method with `biblatex.sty`, then one run of LaTeX followed by one run of BibTeX followed by only one more run of LaTeX should do the job. The other methods require one additoinal run of LaTeX.

0.8   Making a PDF File

The Graduate School expects you to submit your thesis or dissertation online as a pdf file. For many it will be enough to process your main file using **pdflatex**. Important exceptions are if you have used the `pstricks` package or if you import graphics in .ps or .eps format, say using the `\includegraphics` command. The `pstricks` package makes use, down underneath, of PostScript commands that do not work in the Portable Document Format (pdf). The same applies to including files that have PostScript commands in them. If you fall into this case, in essence you must first produce a .dvi file, translate to a .ps file and then translate the .ps file to a .pdf file. Moreover, this must be done with care, since the Graduate School (at the insistence of the Proquest company that archives the theses and dissertations in pdf form) requires that the pdf file that results involve **only embedded fonts**. The programs that do the transformations that change `main.dvi` to `main.ps` and then to `main.pdf` on your particular TeX system may not be set up to lead to all fonts being embedded. So you *might* have to reconfigure your particular TeX set up to achieve an acceptable result. Moreover, this might not entirely fix things. Fortunately, there is a LaTeX package that helps a lot, namely `pst-pdf`. This package offers what amounts to an automatic fix for almost all of the `pstricks` commands. To learn how to use this package, see the package documentation.

Still, sadly, this may not be entirely successful. After you get your `main.pdf` file you should view it using the Acrobat Reader (acroread on linux). You will see a button at the top of the Acrobat Reader screen labelled `file`. Clicking on this button brings down a menu and one of the options is `properties`. Clicking on this option brings up another screen with some buttons at the top. Click on the fonts button. This brings up another window showing a list of fonts. Scroll down this list. If all the fonts are type 1 and labelled `embedded` or `embedded subset`, then everthing is okay. Otherwise some fonts will show up as type 2 or type 3 and will not be labelled as embedded.

If this happens to you, it is probably because you used one of the `pstricks` commands that are problematic or you have used a font (perhaps even a font based on different characters, like Cyrillic) which is not embeddable. The remedy is simply not to use these.

Another difficulty can arise if you have used one of the many programs available to construct graphics and then export them for inclusion in a LaTeX document. Some of these programs put labels on figures using their own system of fonts. These may turn out not to embed, as required. Even the more sophisticated of these programs, which employ LaTeX's font system to make most of the labels, might still label somethings, like axises of coordinate systems with little numerals from fonts that will not embed properly.

0.9 Printing Your Work

The simplest method to print your thesis is to use a printer driver like dvips or whatever is provided on your computer set up to print .dvi files. An alternative is to ask your TeX system to produce a pdf file (say by running pdflatex) and then print the pdf file using the Acrobat Reader program acroread. If you elect this method you should be careful to turn off all the special features on acroread's print menu. This menu pops up when you click the print button. On the left side of this menu you should find a section labelled Print Handling. BE SURE to set the Page Scaling to NONE and uncheck the Auto-Rotate and Center checkbox. If you just blindly click the OK button at the bottom of the print menu (as perhaps you have always done in the past) it is probable that acroread will try to make your document look pretty according to its standard. This means it will likely rescale things and attempt to center them on the page. THIS WILL DESTROY the careful work LaTeX has done to make things conform to the desires of the Graduate School. Of course, since the Graduate School only requires an acceptable pdf file (with the right page layout and other similar stuff), you no longer have to worry about whether the print out looks correct to the Graduate School. On the other hand, your department and you yourself might want a nicely bound version printed on real paper.

There is another problem that sometimes manifests itself when you print out your thesis. Many of the TeX systems available free online were designed in Europe (many in Germany). This means that by default they might be setup for A4 paper. This is like the letter size paper we are familiar with in the US, but it is somewhat longer and narrower. If you install such a system on your computer, be sure to set the paper size to letterpaper (as opposed to blindly clicking the OK button all through the installation process). If you have already installed a system and its default setting is wrong, you may have to reconfigure it.

To conserve paper (and trees) and toner you should keep your printing to a minimum. Usually this means relying mostly on the computer display when reading drafts of your work. Depending on which screen driver (a piece of software that is part of your TeX setup) you use and the kind of graphics that occur in your work, this reliance on the computer screen can work very well. But there will be times when printing out a page or two is necessary. All of the programs used for printing allow you to print out just a few designated pages (rather than all 157 pages of your thesis to see just a few). Because there are pages without a number appearing on them (like the title page) and others where the number is in lower case Roman numerals, you have to be a bit clever about this. The page with number 33 on it might actually be the 49th page of your thesis.

Two commands, \SuspendPrologue and \includeonly, which are described in the next section, can also be used to help you conserve printing.

Finally, occasionally adding color might really help your exposition. In this regard, you should let restraint and simplicity be your guides. No one wants a garish dissertation. If the rare use of color is helpful in your case, you should be aware that color printing in VERY much more costly than black and white. Thus, if you have three pages where color appears you should print only those three pages on a color

printer and the balance of the 157 pages on an ordinary printer.

0.10   Commands Provided by `uscthesis.cls`

Here are some commands provided for your use by `uscthesis.cls`—all but the last three are intended for use in the main file before the `\begin{document}` line.

`\title{}`

Used to make the title page. Your title goes inside the braces. Put this in the main file before the `\begin{document}` command.

`\otherdegrees{}`

Another part of the title page. Use like `\title{}`.

`\degreename{}`

This is for the degree you are working on. The Graduate School maintains a list of approved degrees. Use the appropriate one.

`\degreedate{}`

This is for the year you will finish your degree.

`\degreemonth{}`

This is for the month you you will graduate.

`\college{}`

This is for your college. The Graduate School maintains a official list. Use the appropriate one.

`\field{}`

The Graduate School maintains a list of official degree fields. Use the appropriate one.

`\author{}{}`

Your personal name(s) goes in the first set of braces and your family name goes in the second.

`\advisor{}{}{}`

Put the person's title in the first set of braces and the names in the second. In the third put your advisor's position on your committee. This depends on your department. It might be Major Professor or Director of Dissertation, or something else. There are two similar commands for the honors option: `\reader{}{}` and `\schcsigner{}{}` which work the same way.

`\readera{}{}{}`

Put the person's title in the first set of braces and the names in the second. In the third put your reader's position on your committee. This depends on your department. It might be Committee Member or Second Reader or something else There are three similar commands: `\readerb{}{}{}`,`\readerc{}{}{}`, and

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`\readerd{}{}{}` which work the same way. Use as many as your unit requires (up to four).

`\dean{}{}`

Put the name of the current Dean of the Graduate School here. Include whatever title the Graduate School requires in the second set of braces.

`\copyrightpage`

Use this once in the frontmatter if you want a copyright page.

`\acknowledgments{}`

This is optional. It should be used only before the `\begin{document}` line. Put the text (without a title) of your acknowledgments in some file, say `handlebar.tex`, and then use `\acknowledgments{handlebar}`.

`\dedication{}`

This is like `\acknowledgments{}`.

`\abstract{}`

Like `\acknowledgments{}`, these commands take the first part of a filename, like handlebar, in the braces. Then you must put the contents in the file `handlebar.tex`. The command `\abstract{}` is designed to work with masters theses and doctoral dissertations. The Honors College abstracts have a different layout and, in addition, the Honors College requires a summary. The commands `\honorsabstract{}` and `\summary{}` are provided with the documentclass option honors.

`\listofabbreviations{}` and `\listofsymbols{}`

These commands work like `\dedication{}`. They cause LATEX to search for and load the file (with file extension .tex) whose name is enclosed in those braces. You must devise those files. These lists are optional.

`\makeLoT` and `\makeLoF`

You might have tables (using the LaTeX table environment) or figures (using the LaTeX figure environment) in your thesis or dissertation. The rule of thumb is that if you have four or more tables, then there should be a List of Tables following your table of contents. The same rule of thumb applies to a List of Figures. The uscthesis documentclass produces a List of Tables (a List of Figures) automatically if this command is included in the topmatter.

`\SuspendPrologue`

You can put this command before the `\begin{document}` line. The effect is then that LaTeX will produce a .dvi file from which all the front matter (Title page, abstract, acknowledgments, table of contents, etc.) have been eliminated. This front matter is only really important near the end of the writing process. And of course, you don't want to print it out in the preliminary stages every time you need to make a hard copy of some part of your thesis or dissertation.

`\includeonly{}`

Suppose that in your `main.tex` file you have lines like

```
\include{Introduction}
\include{Squares}
```

If you put `\includeonly{Squares}` before the `\begin{document}` line, then when you process your file only the file `Sqaures.tex` will be included, but all the numberings and cross references from the other files will still be honored. In this way, you can arrange to view and print only the portion of your work that is of current interest. This can also prove useful if you need to track down some bug—for instance a font the is not embedding correctly in the .pdf file. Within the \includeonly command you can list several filenames separated by commas.

`\tighttoc`

It sometimes happens that a line or two of the Table of Contents leaks over onto a second page. Such a tiny amount of text on an otherwise blank page looks bad. To remedy this, in the final stages of polishing your thesis, you might try putting the `\tighttoc` command in the topmatter. It might help.

`\Chaptero{}`

Some of the parts of the main body of your work may have the stature of chapters but require different headings or different treatment in the table of contents. Maybe most people would treat the introduction as Chapter 1 (or even Chapter 0), some might not want the word "Chapter" nor any number to appear in the heading or in the table of contents. The same might apply to a portion of your thesis concerning conclusions. Indeed, the Honors College allows such a portion. To acheive this effect use \Chaptero{Introduction} instead of \Chapter{Introduction}.

`\appendix`

If you have one appendix, insert this command in the operative part of your `main.tex` file just above the line where the appendix is included. If you have more than one appendix, use `\appendices` instead. After issuing and appendix command, use the \input command rather than the \include command.

`\SingleSpacing`

This command makes everything following it set in sinlge spacing rather than the double spacing that dominates theses and dissertation. This command should only be used in restricted settings, in order to conform with the Graduate School requirements. There are three kinds of such settings that can crop up. First is the various LaTeX environments that display several lines. This includes such environments as `quote,quotation,` and `verse` as well as those environments that display several lines of formulas. In general, the vertical spacing of formulas that LaTeX calculates is designed to work with single spacing.

This means that the ratio between vertical and horizontal spacing in displayed equations will not be correct in the prevailing double spacing setup. So you should enclose such display environments something like this

```
{\SingleSpacing
   \begin{align*}
        ...
   \end{align*}
        }
```

The { preceding the \SingleSpacing command and the } following the \end{align*} ensure that the single spacing is only in effect for that particular range of text. The other two common cases are the `tabular` environments (and its variations) and the `picture` environments (and its variations). These should also be enclosed with a leading \SingleSpacing—**BUT** \SingleSpacing should not be used if you enclose the `tabular`-like enviroments within LaTeX's `table` environment, nor should \SingleSpacing be used when the `picture`-like environments are enclosed within LaTeX's `figure` environments. The reason is that the `table` and `figure` environments already automatically force single spacing. So using \SingleSpacing with the *other* `tabular` and `picture` uses will make all your figures and tables come out alike. The command \SingleSpacing acts like a switch. The similar command \DoubleSpacing is also available.

There are more commands that you can use. The `uscthesis.cls` documentclass automatically loads the `memoir.cls` documentclass and the following standard La-TeX packages: `array.sty`, `amsmath.sty`, `amssymb.sty`, `ifthen.sty`, `latexsym.sty`, `amsfonts.sty`, `amssymb.sty`, and `amsthm.sty`. This means that the commands provided by these packages are already available when you use the `uscthesis.cls` documentclass. You should be careful with commands that change the spacing between lines, which change the font sizes, and which alter the ways in which chapter headers, section headers and captions are displayed. The Graduate School has requirements about these matters. The documentclass is set up to adhere to these requirements.

0.11   Some Things Left for the Future

The automatic generation of a List of Plates (as well as a new float environment to go along with this) will not be found in the current version. For the more venturesome, a look at the documentation for the `caption.sty` package will show you how to do this on your own. Perhaps in some future version of the documentclass, this will be builtin.

0.12   On the Origin of this Documentclass

The first version of this documentclass was put to use in the fall of 1998. Dr. Zoltan Székely received his PhD in mathematics in December 1998, submitting the first thesis or dissertation prepared using `uscthesis.cls`. This original version of the documentclass was prepared while I was a visiting Ulam Professor at the University of Colorado. I modelled my documentclass on the documentclass `Thesis.cls` developed in 1997–98 by John P. Weiss at the University of Colorado to meet the design specifications for theses at that institution. While these two documentclasses started out much the same, over the ensuing years they have diverged somewhat, in part because the two universities have altered their layout requirements, but also because the worldwide LaTeX community has developed a lot of packages that offer convenient ways to address the various typesetting problems that must be resolved by any similar documentclass.

At a large number of universities around the world one can find similar efforts. Some can be found in the Comprehensive TeX Archive Network (ctan.org). At least three of these share the name `uscthesis`. The earliest I know about was launched in 1987 by Steven Cochran as `USCthesis.sty` (which has grown into `USCthesis.cls`) and was developed to meet the needs of graduate students at the University of Southern California. A later effort at the University of Southern California was made by physicist Zufar Mulyakov. It is called `USC-Thesis.cls`. Closer to home, Prof. José M. Vidal at the Department of Computer Science and Engineering has devised the package `uscthesis.sty` for graduate students at the University of South Carolina.