

The ucdavisthesis class*

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1 Introduction

The `ucdavisthesis` class is a $\text{\LaTeX} 2_{\epsilon}$ class that allows you to create a dissertation or thesis which conforms to UC Davis formatting requirements as of 2009. The output document has the necessary preliminary pages, margins, page number placement, etc. This class also provides most of the macros available in the `report` class, allowing for chapters, sections, etc. Please check the Graduate Studies web page (<http://gradstudies.ucdavis.edu/students/filing.html>) for any changes or updates.

This manual is typeset according to the conventions of the \LaTeX `DOCSTRIP` utility which enables the automatic extraction of the \LaTeX macro source files.

2 Usage

To create a dissertation or thesis which conforms to UC Davis requirements load the class with

```
\documentclass[<class-options>]{ucdavisthesis}
```

at the beginning of your your $\text{\LaTeX} 2_{\epsilon}$ source file. The *<class-options>* are entered as a comma separated list (no spaces). They are described in detail in Section 3. The other commands (macros) necessary to put together a complete document are explained in Section 4.

Please look through the `Sample_Dissertation_Main.tex` file and its subfiles for the proper macro order and helpful suggestions for formatting and organization of your thesis.

3 Class Options

The `ucdavisthesis` class is in itself an alteration of the standard `report` class, thus it keeps most of its class options except those options that would make the document non-conforming and aren't likely to be used for drafts (e.g., `twocolumn`, `notitlepage` and `a4paper`). If you find yourself wanting `report` features that are not available, please let me know.

The possible options for the `ucdavisthesis` class are (default values are in angle brackets):

MA MS ME `<PhD>` **DEngr**
This option formats the title pages to conform to the requirements for a particular degree.

single `<double>`
Sets the document line spacing. NOTE: single line spacing is non-conforming to the UCD format. However, even when using **double** spacing, environments like footnotes, captions and references are kept to single spacing. If there are problems with a particular environment becoming double spaced when using certain packages (e.g., **natbib** or **chapterbib**), see the `\singlespacing` command.

twoside `<false>`
Two-sided printing (for a duplex printer). Adjusts margins and placement of page numbers and headers appropriately. NOTE: two-sided printing is non-conforming to the UCD Format.

openright `<openany>`
This option only makes sense when using the **twoside** option. **openright** forces chapters to begin on odd (right-hand) pages only. The default, **openany** will start a chapter on the next page, whether it is even or odd.

draft draftcls `<final>`
ucdavisthesis provides two draft modes as well as the normal final mode. The **draft** and **draftcls** options provide additional information in the running header, including the text “DRAFT”, the time and date, etc. Additionally, **draft** puts every package used in the document into draft mode (disabling rendering of figures for most graphics packages), while **draftcls** confines the draft mode behavior to just the class file.

nofigureslist `<false>`
Suppress printing of the List of Figures.

notableslist `<false>`
Suppress printing of the List of Tables.

nohyphenatetitles `<hyphenatetitles>`
Choose whether to hyphenate section (and subsection...) titles.

10pt 11pt `<12pt>` **13pt**
Font size to use in the body of document (i.e., `normalsize`). Appropriate font sizes are chosen for the usual array of text size macros (e.g., `\small`, `\large`, `\Large`, etc.). Any of the four size options are acceptable according to the UCD Format.

4 Class Commands

This class file provides many commands that must be used to correctly format your dissertation or thesis. Some are self explanatory, others more obscure. I try

to describe them all below.

4.1 Preliminary Page Commands

Use the following commands to produce all of the preliminary pages (e.g., title page, abstract, etc.). These should be used before the `\makeintropages{}` command is issued.

`\title` This command sets the dissertation/thesis title. Formatting commands are allowed in the argument (e.g., `\textit{}`). The title must always be specified.

`\title{<title>}`

`\author` This command sets the dissertation/thesis author. Only one author is allowed. The author must always be specified.

`\author{<author's name>}`

`\authordegrees` Specify the author's previous degrees on the TITLE PAGE. Separate entries with the end line command `\\`. The author's degrees must always be specified.

`\authordegrees{<list of degrees>}`

For example:

```
\authordegrees{B.S. (University of California, Davis) 1978\\
               M.S. (University of California, Berkeley) 1980}
```

`\officialmajor` Set the official major name (in the degree title). e.g., Electrical and Computer Engineering, Applied Science, Russian, or Entomology. The official name of your major must always be specified.

`\officialmajor{<major's name>}`

`\graduateprogram` Set the graduate program name. It is only used on the UMI abstract page. The graduate program name may be the same as the official major.

`\graduateprogram{<program name>}`

`\thesis` Set the document type to **Thesis**, and the degree name to the command's argument. This command is normally not needed, since an **MA** or **MS** option to `\documentclass` will do the same thing in all standard situations.

`\dissertation` Set the document type to **Dissertation**, and the degree name to the command's argument. This command is normally not needed, since a **PhD** or **DEng** option to `\documentclass` will do the same thing in all standard situations.

`\degreemonth` Set the month in which the degree will be **conferred**, typically, March, June, September or December. Default is the current month (this may not be correct!).

`\degreemonth{<month>}`

`\degreeyear` Set the year in which the degree will be conferred. Default is the current year.

`\degreeyear{<year>}`

<code>\committee</code>	This command will place the committee members' names on the approval lines. This command is used only to make the PDF version for electronic filing where the document's title page has typed names <i>in place of</i> the actual approval signatures. Default is no names. <code>\committee{\langle member 1 \rangle}{\langle member 2 \rangle}{\langle member 3 \rangle}</code>
<code>\copyrightyear</code>	Set the year which appears in the copyright notice. Default is the degree year (see above). <code>\copyrightyear{\langle year \rangle}</code>
<code>\nocopyright</code>	Don't include a copyright notice at all. No page will be produced in its place. Default behavior is to include a copyright page. <code>\nocopyright</code>
<code>\titlesize</code>	Print the document title (on the TITLE and ABSTRACT pages) at a particular size. Default is <code>\Large</code> (17-point when using 12pt option). Although any L ^A T _E X type size name will be accepted, the only other non-default value likely to give satisfactory results is <code>\LARGE</code> (20-point when using 12pt option). <code>\titlesize{\langle size name \rangle}</code>
<code>\dedication</code>	The argument's text is used as the dedication (in a <code>\center</code> environment) on the DEDICATION page. Default is not to have a dedication. <code>\dedication{\langle text \rangle}</code>
<code>\acknowledgments</code>	The argument's text is used for the ACKNOWLEDGMENTS page. Default is not to have an ACKNOWLEDGMENTS page. <code>\acknowledgments{\langle text \rangle}</code>
<code>\abstract</code>	The argument's text is used as the dissertation/thesis abstract. You must include an abstract. There is no limit on length. <code>\abstract{\langle text \rangle}</code>
<code>\makeintropages</code>	Generate the introductory pages in the proper sequence. This command is placed just before your first chapter or section.

4.2 UMI Abstract Formatting

This is usually only used in the final preparation of the dissertation.

<code>\UMIabstract</code>	The text in the argument is used as the UMI abstract. Otherwise, it defaults to using the text from <code>\abstract</code> (hence the square brackets). However, the UMI abstract can't exceed 350 words in length. The UMI abstract is separate from the dissertation abstract and should NOT be included as part of the submitted dissertation. Normally this command is called at the end of the main file, just before <code>\end{document}</code> . The command is ignored if <code>twoside</code> is enabled. <code>\UMIabstract[\langle text \rangle]</code> \Leftarrow Note: square brackets
---------------------------	--

4.3 Text Formatting Commands

These are commands you can use to customize the fonts and font sizes used in the headings. A command is also provided to produce single spacing in certain environments.

`\singlespacing` Set the line spacing to single spacing. Usually `\singlespacing` is required with packages that modify or redefine particular environments (i.e., `thebibliography`). For example, if using the `natbib` package, use the command:

```
\newcommand{\bibfont}{\singlespacing}
```

The `\bibfont` command will make the text *within* references single spaced while there will still be double spacing between each reference. This works even if the `chapterbib` package with the `sectionbib` option is used.

<code>\chaptername</code>	Set the size of the chapter name (i.e., ‘Chapter’). Default size is <code>\Huge</code> .
<code>\chapternamefont</code>	Set the font of the chapter name (i.e., ‘Chapter’). Default font is <code>\bfseries</code> .
<code>\chaptertitle</code>	Set the size of the chapter title. Default size is <code>\huge</code> .
<code>\chaptertitlefont</code>	Set the font of the chapter title. Default font is <code>\bfseries</code> .
<code>\secfont</code>	Set the font type and size of the section title. Default is <code>\bfseries\Large</code> .
<code>\subsecfont</code>	Set the font type and size of the subsection title. Default is <code>\bfseries\large</code> .
<code>\ssubsecfont</code>	Set the font type and size of the subsubsection title. Default is <code>\bfseries\normalsize</code> .

5 Implementation and Source Code Listing for the Class File

This section deals with the package source code. Please, do not read this unless you really need it or have some strange fascination with inspecting L^AT_EX internals (like me). The comments are very short and they typically just tell you where you are. If you are experiencing any problems when testing this class, please send me an email and I will try to solve it.

Also, please feel free to send me emails about feature requests, improvements to the code, or changes to the formatting requirements.

Require `ifthen` package to process options.

```
1 \*class
2 \RequirePackage{ifthen}
```

A command to keep track of the font size option chosen.

```
3 \newcommand\@ptsize{}
```

Define some booleans to control class options like draft mode, list of figures, etc.

```
4 \newif\if@openright % Set to true if openright option set
5 \newif\if@draft % Set to true if draft option set
6 \@draftfalse
7 \newif\if@draftcls % Set to true if draft class option set
8 \@draftclsfalse
```

```

9 \newif\if@figures
10 \@figurestrue           % Make List of Figures
11 \newif\if@tables
12 \@tablestrue           % Make List of Tables

    Some booleans to keep track of where we are in the document processing.
13 \newif\if@prelimpages  % Set to false after producing preliminary pages
14 \@prelimpagestrue

```

5.1 Title Page Macros

Define the title page macros.

```

15 \def\@title{NO TITLE!?!}
16 \def\@author{NO AUTHOR!?!}
17 \def\@authordegrees{NO DEGREES!?!}
18 \def\@memberone{ }\def\@membertwo{ }\def\@memberthree{ }
19 \def\@titlesize{\large}
20 \renewcommand{\title}[1]{\def\@title{#1}}
21 \renewcommand{\author}[1]{\def\@author{#1}}
22 \newcommand{\titlesize}[1]{\def\@titlesize{#1}}
23 \newcommand{\authordegrees}[1]{\def\@authordegrees{#1}}
24 \newcommand{\committee}[3]{\def\@memberone{#1}\def\@membertwo{#2}\def\@memberthree{#3}}

```

The following commands set the official major and graduate program.

```

25 \def\@officialmajor{NO OFFICIAL MAJOR!?!}
26 \newcommand{\officialmajor}[1]{\def\@officialmajor{#1}}
27 \def\@graduateprogram{NO GRADUATE PROGRAM!?!}
28 \newcommand{\graduateprogram}[1]{\def\@graduateprogram{#1}}

```

The following commands will process the MA, MS, ME, PhD, or DEngr option.
(The default is PhD.)

```

29 \newcommand{\thesis}[1]
30   {\def\@thesisname{thesis}
31    \def\@Thesisname{Thesis}
32    \def\@degreename{#1}
33   }
34 \newcommand{\dissertation}[1]
35   {\def\@thesisname{dissertation}
36    \def\@Thesisname{Dissertation}
37    \def\@degreename{#1}
38   }
39 \dissertation{Doctor of Philosophy} % default

```

The following commands set the year in which the degree will be awarded, as well as the year of copyright.

```

40 \def\@degreeyear{\number\year} % default is current year
41 \def\@degreemonth{\ifcase\month\or
42   January\or February\or March\or April\or May\or June\or
43   July\or August\or September\or October\or November\or December\fi}
44 \def\@copyrightyear{\number\year} % default is current year
45 \newif\if@cyrset

```

```

46 \cyrsetfalse
47 \newcommand{\degreeyear}[1]
48   {\def\@degreeyear{#1}\if@cyrset\else\def\@copyrightyear{#1}\fi}
49 \newcommand{\degreemonth}[1]{\def\@degreemonth{#1}}
50 \newcommand{\copyrightyear}[1]{\def\@copyrightyear{#1}\@cyrsettrue}

```

5.2 Option Declarations

Now, we declare the class options.

```

51 \DeclareOption{PhD}{\def\@degreeyear{PhD}} % default -- nothing more to do
52 \DeclareOption{DEngr}{\dissertation{Doctor of Engineering}}
53 \DeclareOption{MA}{\thesis{Master of Arts}}
54 \DeclareOption{MS}{\thesis{Master of Science}}
55 \DeclareOption{ME}{\thesis{Master of Engineering}}
56 %
57 \DeclareOption{10pt}{\renewcommand\@ptsizel{10}}
58 \DeclareOption{11pt}{\renewcommand\@ptsizel{11}}
59 \DeclareOption{12pt}{\renewcommand\@ptsizel{12}} % default size
60 \DeclareOption{13pt}{\renewcommand\@ptsizel{13}}
61 %
62 \DeclareOption{nofigureslist}{\@figuresfalse}
63 \DeclareOption{notableslist}{\@tablesfalse}
64 \DeclareOption{openright}{\@openrighttrue}
65 \DeclareOption{openany}{\@openrightfalse}

```

5.2.1 Line Spacing Definitions

The following commands will process the `single` or `double` option. (The default is `double`.) This controls inter-line spacing.

```

66 \def\@singlespacing{1.0}
67 \def\@doublespacing{1.5} % see LaTeX manual for explanation of value
68 \let\@spacing=\@doublespacing
69 \newcommand{\@titlespacing}{1.2} % Spacing to use in chapter and section titles
70 \DeclareOption{single}{\let\@spacing=\@singlespacing}
71   \let\@titlespacing=\@singlespacing}
72 \DeclareOption{double}{\let\@spacing=\@doublespacing}

```

The following definitions provide a way to get single spacing in some types of environments like `thebibliography`. Just resetting `\baselinestretch` does not seem to work with some of the packages like `natbib`. The code is taken from `setspace.sty` version 6.7 by Geoffrey Tobin.

Line spacing command

```

73 \newcommand{\setstretch}[1]{%
74   \def\baselinestretch{#1}%
75   \@currsize}%

```

Allow users to modify the `\SetSingleSpace` value to something slightly more or less than 1 to help with unusual font heights (when compared to their point size).

```

76 \newcommand{\SetSpaces}[1]{%
77   \def\setspace@singlespace{#1}}
78 \SetSpaces{1}

```

This is the command to call when you want single spacing in a particular environment.

```

79 \newcommand{\singlespacing}{%
80   \setstretch {\setspace@singlespace}% normally 1
81   \vskip \baselineskip} % Correction for coming into |\singlespacing|

```

Modification of the L^AT_EX command `\@setsize` The meanings of the arguments to `\@setsize` appear to be (whatever these may signify): current size; font baselineskip; ignored (!); and font size.

```

82 \def\@setsize#1#2#3#4{%
83   \@nomath#1%
84   \let\@currsize#1%
85   \baselineskip #2%
86   \baselineskip \baselinestretch\baselineskip
87   \parskip \baselinestretch\parskip
88   \setbox\strutbox \hbox{%
89     \vrule height.7\baselineskip
90       depth.3\baselineskip
91       width\z0}%
92   \skip\footins \baselinestretch\skip\footins
93   \normalbaselineskip\baselineskip#3#4}

```

5.2.2 Mark Overfull hboxes

Overfull hboxes are marked.

```

94 \DeclareOption{draft}{\setlength{\overfullrule}{5pt}\@drafttrue\@draftclstrue}
95 \DeclareOption{draftcls}{\setlength{\overfullrule}{5pt}\@draftfalse\@draftclstrue}
96 \DeclareOption{oneside}{\@twosidefalse \@mparswitchfalse}
97 \DeclareOption{twoside}{\@twosidetrue \@mparswitchtrue}
98 \DeclareOption{final}{\setlength{\overfullrule}{0pt}\@draftfalse\@draftclsfalse}

```

Provide Chapter and Section title font and size control

```

99 \def\@chapternamesize{\Huge}
100 \newcommand{\chapternamesize}[1]{\def\@chapternamesize{#1}}
101 \def\@chapternamefont{\bfseries}
102 \newcommand{\chapternamefont}[1]{\def\@chapternamefont{#1}}
103 \def\@chaptertitlesize{\huge}
104 \newcommand{\chaptertitlesize}[1]{\def\@chaptertitlesize{#1}}
105 \def\@chaptertitlefont{\bfseries}
106 \newcommand{\chaptertitlefont}[1]{\def\@chaptertitlefont{#1}}
107 \def\@secfontsize{\bfseries\Large}
108 \newcommand{\secfontsize}[1]{\def\@secfontsize{#1}}
109 \def\@subsecfontsize{\bfseries\large}
110 \newcommand{\subsecfontsize}[1]{\def\@subsecfontsize{#1}}
111 \def\@ssubsecfontsize{\bfseries\normalsize}
112 \newcommand{\ssubsecfontsize}[1]{\def\@ssubsecfontsize{#1}}

```

Provide way to make hyphenating titles optional.

```
113 \newboolean{hyphenatetitles}
114 \setboolean{hyphenatetitles}{true}
115 \DeclareOption{nohyphenatetitles}{\setboolean{hyphenatetitles}{false}}
116 \DeclareOption{hyphenatetitles}{\setboolean{hyphenatetitles}{true}}
```

Set default options and then execute the options.

```
117 \ExecuteOptions{double,12pt,oneside,final,openany}
118 \ProcessOptions\relax
```

Redefine how `\cleardoublepage` works so that it behaves differently when the `twoside` option is chosen.

```
119 \renewcommand{\cleardoublepage}{\clearpage%
120   \if@twoside
121     \ifodd\c@page
122       \else
123         \null\thispagestyle{empty}\newpage% make a blank page
124       \fi
125   \fi}
```

5.3 Page Layout

UCD format requires only letter paper size be used.

```
126 \setlength{\paperheight}{11in}
127 \setlength{\paperwidth}{8.5in}
```

All margin dimensions measured from a point one inch from top and side of page (standard \TeX). A little extra (0.1 in) is added on each side to ensure that the text will fall within the thesis margin limits even if photo-copying enlarges or misaligns it slightly.

According to the UCD format, margins are to be 1.5 inch left, 1 inch top, right, and bottom with the page numbers allowed to be outside these margins.

5.3.1 Side Margins

```
128 \if@twoside % twoside is non-conforming to UC format
129   \setlength{\oddsidemargin}{0.6in} % these are added to
130   \setlength{\evensidemargin}{0.1in} % LaTeX's 1 inch left margin
131 \else % Note that \oddsidemargin = \evensidemargin
132   \setlength{\oddsidemargin}{0.6in} % these are added to LaTeX's
133   \setlength{\evensidemargin}{0.6in} % 1 inch left margin.
134 \fi
```

5.3.2 Vertical Spacing

Top of page: `\topmargin` is the nominal distance from \TeX 's 1 inch top margin to the top of the box containing the running head. `\headheight` is the height of the box containing the running head. `\headsep` is the space between the running head and text.

```
135 \setlength{\topmargin}{-0.6in}
```

```
136 \setlength{\headheight}{0.2in}
137 \setlength{\headsep}{0.5in}
```

Bottom of page: `\footskip` is the distance from baseline of box containing foot to baseline of last line of text.

```
138 \setlength{\footskip}{0.6in}
```

5.3.3 Dimensions of Text

`\textheight` is the height of the text (including footnotes and figures, excluding running header and footer). `\textwidth` is the width of text line.

```
139 \setlength{\textheight}{8.8in}
140 \setlength{\textwidth}{5.8in}
```

A `\raggedbottom` command causes ‘ragged bottom’ pages: pages set to natural height instead of being stretched to exactly `\textheight`.

5.3.4 Input Font Size Info

The appropriate `ucdthesis1x.clo` file defines things that depend on the type size. In order to meet the UCD requirements, font size must be between 10 and 13 points.

```
141 \input{ucdthesis\@ptsize.clo} % \@ptsize is determined by the class option
```

5.4 Lists

5.4.1 Enumerate

Enumeration is done with four counters: `enumi`, `enumii`, `enumiii` and `enumiv`, where `enumN` controls the numbering of the N th level enumeration. The label is generated by the commands `\labelenumi` ... `\labelenumiv`. The expansion of `\p@enumN\theenumN` defines the output of a `\ref` command.

```
142 \renewcommand\theenumi{\@arabic\c@enumi}
143 \renewcommand\theenumii{\@alph\c@enumii}
144 \renewcommand\theenumiii{\@roman\c@enumiii}
145 \renewcommand\theenumiv{\@Alph\c@enumiv}
146 \newcommand\labelenumi{\theenumi.}
147 \newcommand\labelenumii{(\theenumii)}
148 \newcommand\labelenumiii{\theenumiii.}
149 \newcommand\labelenumiv{\theenumiv.}
150 \renewcommand\p@enumii{\theenumi}
151 \renewcommand\p@enumiii{\theenumi(\theenumii)}
152 \renewcommand\p@enumiv{\p@enumiii\theenumiii}
```

5.4.2 Itemize

Itemization is controlled by four commands: `\labelitemi`, `\labelitemii`, `\labelitemiii`, and `\labelitemiv`, which define the labels of the various itemization levels.

```

153 \newcommand\labelitemi{\textbullet}
154 \newcommand\labelitemii{\normalfont\bfseries \textendash}
155 \newcommand\labelitemiii{\textasteriskcentered}
156 \newcommand\labelitemiv{\textperiodcentered}

```

5.4.3 Verse

The verse environment is defined by making clever use of the list environment's parameters. The user types `\let` to end a line. This is implemented by `\let'in \let equal \@centercr`.

```

157 \newenvironment{verse}
158     {\let\let\@centercr
159     \list{}{\itemsep \z@
160     \itemindent -1.5em%
161     \listparindent\itemindent
162     \rightmargin \leftmargin
163     \advance\leftmargin 1.5em}%
164     \item\relax}
165     {\endlist}

```

5.4.4 Quotation

Fills lines and indents paragraph.

```

166 \newenvironment{quotation}
167     {\list{}{\listparindent 1.5em%
168     \itemindent \listparindent
169     \rightmargin \leftmargin
170     \parsep \z@ \@plus\p@}%
171     \item\relax}
172     {\endlist}

```

5.4.5 Quote

Same as quotation except no paragraph indentation.

```

173 \newenvironment{quote}
174     {\list{}{\rightmargin\leftmargin}%
175     \item\relax}
176     {\endlist}

```

5.4.6 Labels

To change the formatting of the label, you must redefine `\descriptionlabel`.

```

177 \newenvironment{description}
178     {\list{}{\labelwidth\z@ \itemindent-\leftmargin
179     \let\makelabel\descriptionlabel}}
180     {\endlist}
181 \newcommand*\descriptionlabel[1]{\hspace\labelsep
182     \normalfont\bfseries #1}

```

5.5 Other Environments

5.5.1 Default Title Page

In the normal environments, the `titlepage` environment does nothing but start and end a page.

```
183 \newenvironment{titlepage}
184   {%
185     \newpage
186     \thispagestyle{prelim}%
187   }%
188   {\newpage
189     \if@twoside\else
190     \fi
191   }
```

5.5.2 Array and Tabular

`\arraycolsep` is half the space between columns in an array environment. `\tabcolsep` is half the space between columns in a tabular environment. `\arrayrulewidth` is the width of rules in array and tabular environment. `\doublerulesep` is the space between adjacent rules in array or tabular environment.

```
192 \setlength\arraycolsep{5\p@}
193 \setlength\tabcolsep{6\p@}
194 \setlength\arrayrulewidth{.4\p@}
195 \setlength\doublerulesep{2\p@}
```

5.5.3 Tabbing

`\tabbingsep` is the space used by the `\'` command (see L^AT_EX manual).

```
196 \setlength\tabbingsep{\labelsep}
```

5.5.4 Minipage

`@minipagerestore` is called upon entry to a minipage environment to set up things that are to be handled differently inside a minipage environment. In the current styles, it does nothing.

```
197 \skip\@mpfootins = \skip\footins
```

5.5.5 Framebox

`\fboxsep` is the space left between box and text by `\fbox` and `\framebox`. `\fboxrule` is the width of rules in box made by `\fbox` and `\framebox`.

```
198 \setlength\fboxsep{3\p@}
199 \setlength\fboxrule{.4\p@}
```

5.6 Chapters and Sections

5.6.1 Define Counters

`\newcounter{<NEWCTR>}[OLDCTR]` Defines NEWCTR to be a counter, which is reset to zero when counter OLDCTR is stepped. Counter OLDCTR must already be defined.

```
200 \newcounter {part}
201 \newcounter {chapter}
202 \newcounter {section}[chapter]
203 \newcounter {subsection}[section]
204 \newcounter {subsubsection}[subsection]
205 \newcounter {paragraph}[subsubsection]
206 \newcounter {subparagraph}[paragraph]
```

For any counter CTR, `\theCTR` is a macro that defines the printed version of counter CTR. It is defined in terms of the following macros:

`\arabic{<COUNTER>}` : The value of COUNTER printed as an arabic numeral. `\roman{<COUNTER>}` : Its value printed as a lower-case roman numeral. `\Roman{<COUNTER>}` : Its value printed as an upper-case roman numeral. `\alph{<COUNTER>}` : Value of COUNTER printed as a lower-case letter: 1 = a, 2 = b, etc. `\Alph{<COUNTER>}` : Value of COUNTER printed as an upper-case letter: 1 = A, 2 = B, etc.

```
207 \renewcommand \thepart {\@Roman\c@part}
208 \renewcommand \thechapter {\@arabic\c@chapter}
209 \renewcommand \thesection {\thechapter.\@arabic\c@section}
210 \renewcommand\thesubsection {\thesection.\@arabic\c@subsection}
211 \renewcommand\thesubsubsection{\thesubsection .\@arabic\c@subsubsection}
212 \renewcommand\theparagraph {\thesubsubsection.\@arabic\c@paragraph}
213 \renewcommand\thesubparagraph {\theparagraph.\@arabic\c@subparagraph}
```

5.6.2 Chapter Name

`\@chapapp` is initially defined to be ‘CHAPTER’. The `\appendix` command redefines it to be ‘APPENDIX’.

```
214 \newcommand\@chapapp{\chaptername}
    \secdef{\UNSTARCMDs}{\STARCMDs}
```

When defining a `\chapter` or `\section` command without using `\@startsection`, you can use `\secdef` as follows:

```
\def\chapter ... \secdef \CMDA \CMDB
\def\CMDA[# 1]# 2{ ... } Command to define \chapter[...]{...}
\def\CMDB# 1{ ... } Command to define \chapter*{...}
```

5.6.3 Part Macro

```
215 \newcommand\part{%
216   \if@openright
217     \cleardoublepage % Starts new page.
```

```

218 \else
219   \clearpage
220 \fi
221 \thispagestyle{thshead} % Page style of part page is 'thshead'
222   \@tempwafalse % @tempwaf := false
223 \null\vfil % Add fil glue to center title
224 \bgroup \centering % BEGIN centering
225 \secdef\@part\@spart}

226 \def\@part[#1]#2{\ifnum \c@secnumdepth >-2\relax % IF secnumdepth > -2
227   \refstepcounter{part}% % THEN step part counter
228   \addcontentsline{toc}{part}{\thepart\hspace{1em}#1}% add toc line
229 \else % ELSE add unnumbered line
230   \addcontentsline{toc}{part}{#1}%
231 \fi % End if
232 \markboth{}{ }
233 \ifnum \c@secnumdepth >-2\relax % IF secnumdepth > -2
234   \normalsize\bfseries Part\thepart % THEN Print 'Part' and number
235   \par % in \normalsize bold.
236   \vskip 20\p@ % Add space before title.
237 \fi
238 \huge\bfseries #2\par\@endpart} % Print Title in \huge bold.

Print title in \normalsize boldface
239 \def\@spart#1{\normalsize\bfseries #1\par\@endpart} %
  \@endpart finishes the part page
240 \def\@endpart{\vfil\newpage % End page with 1fil glue.
241 \if@twoside
242   \if@openright
243     \null
244     \thispagestyle{empty}%
245     \newpage
246   \fi
247 \fi
248 \if@tempwaf % IF @tempwaf = true
249   \twocolumn % THEN \twocolumn
250 \fi}

5.6.4 Chapter Macro

251 \newcommand\chapter{%
252 \if@openright\cleardoublepage\else\clearpage\fi % Starts new page.
253 \if@prelimpages % Are we on preliminary pages?
254 \thispagestyle{prelim} % if yes, format for preliminary pages
255 \else
256 \thispagestyle{thshead} % Otherwise it is the main text
257 \fi
258 \global\@topnum\z@ % Prevents figures at top of first page in chapter.
259 \@afterindentfalse % Suppress indent in first paragraph,
260 \secdef\@chapter\@schapter} % change to \@afterindenttrue to indent.

261 \def\@chapter[#1]#2{\ifnum \c@secnumdepth >\m@ne

```

```

262     \refstepcounter{chapter}%
263     \typeout{\@chapapp\space\thechapter.}%
264     \addcontentsline{toc}{chapter}%
265         {\protect\numberline{\thechapter}#1}%
266     \else
267         \addcontentsline{toc}{chapter}{#1}%
268     \fi
269     \chaptermark{#1}%
270     \addtocontents{lof}{\protect\addvspace{10\p@}}% Adds between-chapter space
271     \addtocontents{lot}{\protect\addvspace{10\p@}}% to lists of figs & tables.
272     \@makechapterhead{#2}%
273     \@afterheading} % Routine called after chapter and section heading.

    \@makechapterhead{<TEXT>} Makes the heading for the \chapter com-
    mand.
274 \def\@makechapterhead#1{%
275     \vspace*{50\p@}%
276     {\renewcommand\baselinestretch{\@titlespacing}% set spacing for chapter title
277     \parindent \z@ \raggedright \normalfont
278     \ifnum \c@secnumdepth >\m@ne
279         \@chapternamefont\@chapternamesize \@chapapp\space \thechapter
280         \par\nobreak
281         \vskip 20\p@
282     \fi
283     \interlinepenalty\@M
284     \@chaptertitlefont\@chaptertitlesize #1\par\nobreak
285     \vskip 40\p@
286 } \renewcommand\baselinestretch{\@spacing}\@normalsize}% return to \@spacing

    \@makeschapterhead{<TEXT>} Makes the heading for the \chapter* com-
    mand.
287 \def\@schapter#1{\@makeschapterhead{#1}\@afterheading}
288 \def\@makeschapterhead#1{%           % Heading for \chapter* command
289     \vspace*{-30\p@}%                 % Space at top of page.
290     {\parindent \z@ \raggedright
291     \normalfont
292     \interlinepenalty\@M
293     \centering \large \scshape% % Title font.
294     #1\par\nobreak                    % Title and TeX penalty to prevent page break.
295     \vskip 20\p@                      % Space between title and text.
296 }}

```

5.6.5 Sectioning Macros

```

\@startsection{<NAME>}{<LEVEL>}{<INDENT>}{<BEFORESKIP>}
{<AFTERSKIP>}{<STYLE>} optional * [ALTHEADING]{<HEADING>}

```

Generic command to start a section.

NAME : e.g., 'subsection'

LEVEL : a number, denoting depth of section – e.g., chapter=1, section = 2, etc. A section number will be printed if and only if LEVEL ≤ the value of the secnumdepth

counter.

INDENT : Indentation of heading from left margin BEFORESKIP : Absolute value = skip to leave above the heading. If negative, then paragraph indent of text following heading is suppressed. AFTERSKIP : if positive, then skip to leave below heading, else - skip to leave to right of run-in heading. STYLE : commands to set style If '*' missing, then increment the counter. If it is present, then there should be no [ALTHEADING] argument. A sectioning command is normally defined to startsection + its first six arguments. Note: for ?SKIP, negation applies to all components of a skip – the negative of (10pt plus 5pt minus 2.5pt) is (slightly surprisingly) (-10pt plus -5pt minus -2.5pt)

```
297 \ifthenelse{\boolean{hyphenatetitles}}{%
298   \newcommand{\TitleHyphenation}{}%
299 }{%
300   \newcommand{\TitleHyphenation}{%
301     \pretolerance=10000%
302     \hyphenpenalty=200%
303     \raggedright}%
304   }
305 \newcommand\section{\@startsection {section}{1}{\z@}%
306     {-2.0ex \@plus -.5ex \@minus -.2ex}%
307     {.75ex \@plus .1ex}%
308     {\normalfont\renewcommand\baselinestretch{\@titlespacing}%
309     \@secfontsize\TitleHyphenation}}
310 \newcommand\subsection{\@startsection{subsection}{2}{\z@}%
311     {-1.5ex\@plus -.5ex \@minus -.2ex}%
312     {.5ex \@plus .1ex}%
313     {\normalfont\renewcommand\baselinestretch{\@titlespacing}%
314     \@subsecfontsize\TitleHyphenation}}
315 \newcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
316     {-1.0ex\@plus -.3ex \@minus -.1ex}%
317     {.5ex \@plus .1ex}%
318     {\normalfont\renewcommand\baselinestretch{\@titlespacing}%
319     \@ssubsecfontsize\TitleHyphenation}}
```

Because `\{sub,}paragraph` are in-line, we allow hyphenation always.

```
320 \newcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
321     {.75ex \@plus .2ex \@minus .1ex}%
322     {-1em}%
323     {\normalfont\normalsize\bfseries}}
324 \newcommand\subparagraph{\@startsection{subparagraph}{4}{\parindent}%
325     {.75ex \@plus .2ex \@minus .1ex}%
326     {-1em}%
327     {\normalfont\normalsize\bfseries}}
```

Default initializations of `\dotsmark` commands. (See below for their use in defining page styles).

```
328 \newcommand*\chaptermark[1]{}
```

The value of the counter `secnumdepth` gives the depth of the highest-level sectioning command that is to produce section numbers.

```
329 \setcounter{secnumdepth}{3}
```

5.6.6 Appendix

The `\appendix` command must do the following:

- reset the chapter counter to zero
- set `\@chapapp` to Appendix (for messages)
- redefine the chapter counter to produce appendix numbers
- reset the section counter to zero
- redefine the `\chapter` command if appendix titles and headings are to look different from chapter titles and headings.

```
330 \newcommand\appendix{\par%
331 \setcounter{chapter}{0}%
332 \setcounter{section}{0}%
333 \gdef\@chapapp{\appendixname}%
334 \gdef\thechapter{\@Alph\c@chapter}}
```

5.7 Default List Parameters

The following commands are used to set the default values for the list environment's parameters. See the L^AT_EX manual for an explanation of the meanings of the parameters. Defaults for the list environment are set as follows. First, `\rightmargin`, `\listparindent` and `\itemindent` are set to 0pt. Then, for a *K*th level list, the command `\@listK` is called, where *K* denotes i, ii, ... , vi. (i.e., `\@listiii` is called for a third-level list.) By convention, `\@listK` should set `\leftmargin` to `\leftmarginK`.

For efficiency, level-one list's values are defined at top level, and `\@listi` is defined to set only `\leftmargin`.

```
335 \setlength\leftmargini {2.5em}
336 \leftmargin \leftmargini
337 \setlength\leftmarginii {2.2em} % > \labelsep + width of '(m)'
338 \setlength\leftmarginiii {1.87em} % > \labelsep + width of 'vii.'
339 \setlength\leftmarginiv {1.7em} % > \labelsep + width of 'M.'
340 \setlength\leftmarginv {1em}
341 \setlength\leftmarginvi {1em}
342 \setlength \labelsep {.5em}
343 \setlength \labelwidth{\leftmargini}
344 \addtolength\labelwidth{-\labelsep}
345 \parsep 5pt plus 2.5pt minus 1pt
346 \def\@listI{\leftmargin\leftmargini}
347 \let\@listi\@listI
348 \def\@listii{\leftmargin\leftmarginii
349 \labelwidth\leftmarginii\advance\labelwidth-\labelsep
350 \topsep 5pt plus 2.5pt minus 1pt
351 \parsep 2.5pt plus 1pt minus 1pt
352 \itemsep \parsep}
353 \def\@listiii{\leftmargin\leftmarginiii
354 \labelwidth\leftmarginiii\advance\labelwidth-\labelsep
```

```

355     \topsep 2.5pt plus 1pt minus 1pt
356     \parsep \z@ \partopsep 1pt plus 0pt minus 1pt
357     \itemsep \topsep}
358 \def\@listiv{\leftmargin\leftmarginiv
359     \labelwidth\leftmarginiv\advance\labelwidth-\labelsep}
360 \def\@listv{\leftmargin\leftmarginv
361     \labelwidth\leftmarginv\advance\labelwidth-\labelsep}
362 \def\@listvi{\leftmargin\leftmarginvi
363     \labelwidth\leftmarginvi\advance\labelwidth-\labelsep}

```

5.8 Table of Contents, etc.

A `\subsection` command writes a

```
\contentsline{<subsection>}{<TITLE>}{<PAGE>}
```

command on the `.toc` file, where `TITLE` contains the contents of the entry and `PAGE` is the page number. If subsections are being numbered, then `TITLE` will be of the form

```
\numberline{<NUM>}{<HEADING>}
```

where `NUM` is the number produced by `\thesubsection`. Other sectioning commands work similarly.

A `\caption` command in a `figure` environment writes

```
\contentsline{<figure>}{
<NUM>}{<CAPTION>}{<PAGE>}
```

on the `.lof` file, where `NUM` is the number produced by `\thefigure` and `CAPTION` is the figure caption. It works similarly for a `table` environment.

The command `\contentsline{NAME}` expands to `\l@NAME`. So, to specify the Table of Contents, we must define `\l@chapter`, `\l@section`, `\l@subsection`, ...; to specify the list of figures, we must define `\l@figure`; and so on. Most of these can be defined with the `\@dottedtocline` command, which works as follows.

```
\@dottedtocline{<LEVEL>}{<INDENT>}{<NUMWIDTH>}{
<TITLE>}{<PAGE>}
```

`LEVEL` : An entry is produced only if `LEVEL` \leq value of `tocdepth` counter. Note, `\chapter` is level 0, `\section` is level 1, etc. `INDENT` : The indentation from the outer left margin of the start of the contents line. `NUMWIDTH` : The width of a box in which the section number is to go, if `TITLE` includes a `\numberline` command.

This command uses the following three parameters, which are set with a `\def` (so em's can be used to make them depend upon the font). `\@pnumwidth` : The width of a box in which the page number is put. `\@tocrmarg` : The right margin for multiple line entries. One wants `\@tocrmarg` \geq `\@pnumwidth` `\@dotsep` : Separation between dots, in mu units. Should be `\def`'d to a number like 2 or 1.7

```

364 \newcommand\@pnumwidth{1.75em}
365 \newcommand\@tocrmarg{2.75em}
366 \newcommand\@dotsep{4.5}
367 \setcounter{tocdepth}{2}

```

5.8.1 Table of Contents

```

368 \newcommand\tableofcontents{%
369     \chapter*\contentsname
370     \mkboth{%
371         \contentsname}{\contentsname}}%
372     \renewcommand\baselinestretch{\@spacing}\@normalsize\@starttoc{toc}%
373 }
374 \newcommand*\l@part[2]{%
375     \ifnum \c@tocdepth >-2\relax
376     \addpenalty{-\@highpenalty}%
377     \addvspace{2.25em \@plus\p@}%
378     \setlength\@tempdima{3em}%
379     \begingroup
380     \parindent \z@ \rightskip \@pnumwidth
381     \parfillskip -\@pnumwidth
382     {\leavevmode
383     \large \bfseries #1\hfil \hb@xt@\@pnumwidth{\hss #2}}\par
384     \nobreak
385     \global\@nobreaktrue
386     \everypar{\global\@nobreakfalse\everypar{}}%
387     \endgroup
388     \fi}
389 \newcommand*\l@chapter[2]{%
390     \ifnum \c@tocdepth >\m@ne
391     \addpenalty{-\@highpenalty}%
392     \vskip 1.0em \@plus\p@
393     \setlength\@tempdima{1.5em}%
394     \begingroup
395     \parindent \z@ \rightskip \@pnumwidth
396     \parfillskip -\@pnumwidth
397     \leavevmode \bfseries
398     \advance\leftskip\@tempdima
399     \hskip -\leftskip
400     #1\nobreak\hfil \nobreak\hb@xt@\@pnumwidth{\hss #2}\par
401     \penalty\@highpenalty
402     \endgroup
403     \fi}
404 \newcommand*\l@section{\@dottedtocline{1}{1.5em}{2.3em}}
405 \newcommand*\l@subsection{\@dottedtocline{2}{3.8em}{3.2em}}
406 \newcommand*\l@subsubsection{\@dottedtocline{3}{7.0em}{4.1em}}
407 \newcommand*\l@paragraph{\@dottedtocline{4}{10em}{5em}}
408 \newcommand*\l@subparagraph{\@dottedtocline{5}{12em}{6em}}

```

5.8.2 List of Figures

```
409 \newcommand\listoffigures{%
410   \if@figures\chapter*{\listfigurename}%
411     \mkboth{\listfigurename}%
412       {\listfigurename}%
413   \addcontentsline{toc}{section}{\listfigurename}%
414   \@starttoc{lof}%
415 \fi}
416 \newcommand*{\l@figure{\@dottedtocline{1}{1.5em}{2.3em}}
```

5.8.3 List of Tables

```
417 \newcommand\listoftables{%
418   \if@tables\chapter*{\listtablename}%
419     \mkboth{%
420       \listtablename}%
421       {\listtablename}%
422   \addcontentsline{toc}{section}{\listtablename}%
423   \@starttoc{lot}%
424 \fi}
425 \let\l@table\l@figure
```

5.8.4 Bibliography

The `thebibliography` environment executes the following commands:

`\def\newblock{\hskip .11em plus .33em minus -.07em}` – Defines the ‘closed’ format, where the blocks (major units of information) of an entry run together.

`\sloppy` – Used because it’s rather hard to do line breaks in bibliographies,

```
426 \newdimen\bibindent
427 \setlength\bibindent{1.5em}
428 \newenvironment{thebibliography}[1]
429   {\chapter*{\bibname}%
430    \mkboth{\bibname}{\bibname}%
431    \renewcommand\baselinestretch{1}%
432    \list{\@biblabel{\@arabic\c@enumiv}}%
433      {\settowidth\labelwidth{\@biblabel{#1}}%
434       \leftmargin\labelwidth
435       \advance\leftmargin\labelsep
436       \@openbib@code
437       \usecounter{enumiv}%
438       \let\p@enumiv\@empty
439       \renewcommand\theenumiv{\@arabic\c@enumiv}
440       \renewcommand\baselinestretch{\@singlespacing}\@normalsize % enforce single spacing
441   }%
442   \sloppy
443   \clubpenalty4000
444   \@clubpenalty \clubpenalty
445   \widowpenalty4000%
446   \sfcode'\.\@m}
447 {\def\@noitemerr
```

```

448     {\@latex@warning{Empty ‘thebibliography’ environment}}%
449     \renewcommand\baselinestretch{\@spacing}\@normalsize % return to original line spacing
450     \endlist}
451 \newcommand\newblock{\hskip .11em\@plus.33em\@minus.07em}
452 \let\@openbib@code\@empty

```

\def\@biblabel#1{[#1]\hfill} Produces the label for a \bibitem[...] command. \def\@cite#1{[#1]} Produces the output of the \cite command.

5.8.5 The Index

THE THEINDEX ENVIRONMENT Produces double column format, with each paragraph a separate entry. The user commands \item, \subitem and \subsubitem are used to produce the entries, and \indexspace adds an extra vertical space that’s the right size to put above the first entry with a new letter of the alphabet.

```

453 \newif\if@restonecol % used to restore one-column format after index
454                       %(two column not used outside the index environment)
455 \newenvironment{theindex}
456     {\@restonecoltrue
457     \twocolumn[\@makeschapterhead{\indexname}]%
458     \@mkboth{\indexname}%
459     {\indexname}%
460     \thispagestyle{thshead}\parindent\z@
461     \parskip\z@ \@plus .3\p@\relax
462     \columnseprule \z@
463     \columnsep 35\p@
464     \let\item\@idxitem}
465     {\if@restonecol\onecolumn\else\clearpage\fi}
466 \newcommand\@idxitem{\par\hangindent 40\p@}
467 \newcommand\subitem{\@idxitem \hspace*{20\p@}}
468 \newcommand\subsubitem{\@idxitem \hspace*{30\p@}}
469 \newcommand\indexspace{\par \vskip 10\p@ \@plus5\p@ \@minus3\p@\relax}

```

5.8.6 Footnotes

\footnoterule is a macro to draw the rule separating the footnotes from the text. It should take zero vertical space, so it needs a negative skip to compensate for any positive space taken by the rule. (See plain.tex.)

```

470 \renewcommand\footnoterule{%
471     \kern-3\p@
472     \hrule\@width.4\columnwidth
473     \kern2.6\p@}
474 \@addtoreset{footnote}{chapter} % Numbers footnotes within chapters
475 \makefnmark{NOTE} :
476 \newcommand\makefnmark[1]{%
477     \parindent 1em%
478     \noindent
479     \hb@xt@1.8em{\hss\@makefnmark}#1}

```

`\@makefnmark` : A macro to generate the footnote marker that goes in the text. Default used.

5.9 Figures and Tables

5.9.1 Float Placement Parameters

See L^AT_EX manual for their definition.

```
479 \setcounter{topnumber}{4}
480 \renewcommand\topfraction{.9}
481 \setcounter{bottomnumber}{4}
482 \renewcommand\bottomfraction{.7}
483 \setcounter{totalnumber}{10}
484 \renewcommand\textfraction{.1}
485 \renewcommand\floatpagefraction{.66}
486 \setcounter{dbltopnumber}{4}
487 \renewcommand\dbltopfraction{.66}
488 \renewcommand\dblfloatpagefraction{.66}
```

`\@makecaption{<NUMBER>}{<TEXT>}` : Macro to make a figure or table caption. NUMBER : Figure or table number—e.g., 'Figure 3.2' TEXT : The caption text. Macro should be called inside a `\parbox` of right width, with `\normalsize`.

```
489 \newlength\abovecaptionskip
490 \newlength\belowcaptionskip
491 \setlength\abovecaptionskip{6\p@}
492 \setlength\belowcaptionskip{0\p@}
493 \long\def\@makecaption#1#2{%
494   \renewcommand{\baselinestretch}{1.0}
495   \small
496   \vskip\abovecaptionskip
497   \sbox\@tempboxa{#1. #2}%
498   \ifdim \wd\@tempboxa >0.9\hsize%
499     \hskip.05\hsize\parbox{0.9\hsize}{#1. #2}%\par
500   \else
501     \global \@minipagefalse
502     \hb@xt@\hsize{\hfil\box\@tempboxa\hfil}%
503   \fi
504   \normalsize
505   \vskip\belowcaptionskip
506 }
```

To define a float of type TYPE (e.g., TYPE = figure), the document style must define the following.

`\fps@TYPE` : The default placement specifier for floats of type TYPE.

`\ftype@TYPE` : The type number for floats of type TYPE. Each TYPE has associated a unique positive TYPE NUMBER, which is a power of two. E.g., figures might have type number 1, tables type number 2, programs type number 4, etc.

`\ext@TYPE` : The file extension indicating the file on which the contents list for float type TYPE is stored. For example, `\ext@figure = 'lof'`.

`\fnum@TYPE` : A macro to generate the figure number for a caption. For example, `\fnum@TYPE == Figure \thefigure`.

The actual float-making environment commands—e.g., the commands `\figure` and `\endfigure`—are defined in terms of the macros `\@float` and `\end@float`, which are described below.

`\@float{<TYPE>}{</>}PLACEMENT` : Macro to begin a float environment for a single-column float of type TYPE with PLACEMENT as the placement specifier. The default value of PLACEMENT is defined by `\fps@TYPE`. The environment is ended by `\end@float`. E.g., `\figure == \@float{figure}, \endfigure == \end@float`.

5.9.2 Figure

```

507 \newcounter{figure}[chapter]
508 \renewcommand \thefigure
509     {\ifnum \c@chapter>\z@ \thechapter.\fi \@arabic\c@figure}
510 \def\fps@figure{tbp}
511 \def\ftype@figure{1}
512 \def\ext@figure{lof}
513 \def\fnum@figure{%
514 \figurename\nobreakspace\thefigure}% Text with caption figure number
515 \newenvironment{figure}
516     {\@float{figure}}
517     {\end@float}
518 \newenvironment{figure*}
519     {\@dblfloat{figure}}
520     {\end@dblfloat}

```

5.9.3 Table

```

521 \newcounter{table}[chapter]
522 \renewcommand \thetable
523     {\ifnum \c@chapter>\z@ \thechapter.\fi \@arabic\c@table}
524 \def\fps@table{tbp}
525 \def\ftype@table{2}
526 \def\ext@table{lot}
527 \def\fnum@table{\tablename\nobreakspace\thetable}
528 \newenvironment{table}
529     {\@float{table}}
530     {\end@float}
531 \newenvironment{table*}
532     {\@dblfloat{table}}
533     {\end@dblfloat}

```

5.10 Page Styles

The page style 'foo' is defined by defining the command `\ps@foo`. This command should make only local definitions. There should be no stray spaces in the definition, since they could lead to mysterious extra spaces in the output.

The `\ps@...` command defines the macros `\@oddhead`, `\@oddfoot`, `\@evenhead`, and `\@evenfoot` to define the running heads and feet—e.g., `\@oddhead` is the macro to produce the contents of the heading box for odd-numbered pages. It is called inside an `\hbox` of width `\textwidth`.

To make headings determined by the sectioning commands, the page style defines the commands `\chaptermark`, `\sectionmark`, ... , where `\chaptermark{<TEXT>}` is called by `\chapter` to set a mark, and so on. The `...\mark` commands and the `...head` macros are defined with the help of the following macros. (All the `...\mark` commands should be initialized to no-ops.)

MARKING CONVENTIONS: L^AT_EX extends T_EX's `\mark` facility by producing two kinds of marks a 'left' and a 'right' mark, using the following commands: `\markboth{<LEFT>}{<RIGHT>}` : Adds both marks. `\markright{<RIGHT>}` : Adds a 'right' mark. `\leftmark` : Used in the `\@oddhead`, `\@oddfoot`, `\@evenhead` or `\@evenfoot` macro, gets the current 'left' mark. Works like T_EX's `\botmark` command. `\rightmark` : Used in the `\@oddhead`, `\@oddfoot`, `\@evenhead` or `\@evenfoot` macro, gets the current 'right' mark. Works like T_EX's `\firstmark` command.

The marking commands work reasonably well for right marks 'numbered within' left marks—e.g., the left mark is changed by a `\chapter` command and the right mark is changed by a `\section` command. However, it does produce somewhat anomalous results if two `\bothmark`'s occur on the same page.

```
534 \mark{{}} % Initializes TeX's marks
```

5.10.1 Preliminary Page Style

Definition of 'prelim' page style that is used for preliminary pages of the thesis (i.e., those that are numbered using small roman numbers (i, ii, iii, etc.) centered at the page bottom.

```
535 \def\ps@prelim{%
536   \if@draftcls % If 'draftcls' option
537     \if@twoside % If 'twoside' option
538       \def\@oddhead{\hfil\textsc{\footnotesize DRAFT \quad\rightmark}}
539       \def\@evenhead{\textsc{\footnotesize DRAFT \quad\leftmark\hfil}}
540     \else
541       \def\@oddhead{\textsc{\footnotesize DRAFT \quad\rightmark\hfil}}
542       \let\@evenhead\@oddhead
543     \fi
544     \let\mkboth\markboth
545     \def\chaptermark##1{%
546       \markboth {%
547         \@chapapp\ thechapter. \ %
548         ##1}}{}}%
549     \def\@oddfoot{\hfil\textrm{-\thepage -}\hfil}
550     \let\@evenfoot\@oddfoot
551   \else
552     \def\@oddhead{}
553     \def\@evenhead{}

```

```

554 \def\@oddfoot{\hfil\textrm{-\thepage -}\hfil}
555 \let\@evenfoot\@oddfoot
556 \fi}

```

5.10.2 Thesis Body Page Style

Definition of thshead page style Note the use of ## 1 for parameter of \def\chaptermark inside the \def\ps@thshead.

```

557 \newlength{\foliosep}
558 \newlength{\UMIfoliosep}
559 % gap separating page number box from edge of text
560 \setlength{\foliosep}{0.34in}
561 % gap separating page number from edge of text
562 \setlength{\UMIfoliosep}{0.25in}

563 \def\ps@thshead{\def\@oddfoot{}\def\@evenfoot{}% No footers.
564 \if@twoside % If 'twoside' option
565 \if@draftcls % If 'draftcls' option
566 \def\@oddhead{\hbox to\textwidth{% Heading on odd (right) pages.
567 {\hfil\textsc{\footnotesize DRAFT \quad\rightmark}}}%
568 % Push the page number into the margin
569 \rlap{\hskip\foliosep\hbox to 20pt{\hfill\thepage}}}}
570 \def\@evenhead{\hbox to\textwidth{% Heading on even (left) pages.
571 % Push the page number into the margin
572 \llap{\hbox to 20pt{\thepage\hfill}\hskip\foliosep}%
573 {\footnotesize DRAFT \quad\leftmark}\hfil}}
574 \let\@mkboth\markboth
575 \def\chaptermark##1{%
576 \markboth {%
577 \ifnum \c@secnumdepth >\m@ne
578 \@chapapp\ \thechapter. \ %
579 \fi
580 ##1}}{}}%
581 \def\sectionmark##1{%
582 \markright {%
583 \ifnum \c@secnumdepth >\z@
584 \thesection. \ %
585 \fi
586 ##1}}
587 \else
588 \def\@oddhead{\hbox to\textwidth{% Heading on odd (right) pages.
589 % Push the page number into the margin
590 \hfill\rlap{\hskip\foliosep\hbox to 20pt{\hfill\thepage}}}}
591 \def\@evenhead{\hbox to\textwidth{% Heading on even (left) pages.
592 % Push the page number into the margin
593 \llap{\hbox to 20pt{\thepage\hfill}\hskip\foliosep}\hfill}}
594 \fi
595 \else
596 \if@draftcls % If 'draft' option
597 \def\@oddhead{\hbox to\textwidth{%

```

```

598     {\textsc{\footnotesize DRAFT \quad\rightmark}}}%
599     \hfil\rlap{\hskip\foliosep\hbox to 20pt{\hfill\thepage}}}}}% Heading.
600     \let\@evenhead\@oddhead
601     \def\chaptermark##1{\markright {\ifnum \c@secnumdepth >\m@ne
602         \@chapapp\ \thechapter. \ \fi ##1}}
603 \else
604     \def\@oddhead{\hbox to\textwidth{%
605         \hfill\rlap{\hskip\foliosep\hbox to 20pt{\hfill\thepage}}}}}% Heading.
606     \let\@evenhead\@oddhead
607 \fi
608 \fi}

```

5.10.3 UMI Abstract Page Style

```

609 \def\ps@UMIheadings{% UMI Abstract Heading for page 2
610 \def\@oddfoot{}\def\@evenfoot{}% No footers
611 \def\@oddhead{\hbox to\textwidth{% Header for odd pages
612 % force page number into right margin
613 \hfill\rlap{\hskip\UMIfoliosep -\thepage -}}}%
614 \let\@evenhead\@oddhead} % Even pages same as odd pages

```

5.10.4 Standard Page Styles

Definition of headings from report.cls.

```

615 \if@twoside
616 \def\ps@headings{%
617     \let\@oddfoot\@empty\let\@evenfoot\@empty
618     \def\@evenhead{\thepage\hfil\slshape\leftmark}%
619     \def\@oddhead{\slshape\rightmark}\hfil\thepage}%
620     \let\@mkboth\markboth
621     \def\chaptermark##1{%
622         \markboth {\MakeUppercase{%
623             \ifnum \c@secnumdepth >\m@ne
624                 \@chapapp\ \thechapter. \ %
625             \fi
626             ##1}}-{}%
627     \def\sectionmark##1{%
628         \markright {\MakeUppercase{%
629             \ifnum \c@secnumdepth >\z@
630                 \thesection. \ %
631             \fi
632             ##1}}}}
633 \else
634 \def\ps@headings{%
635     \let\@oddfoot\@empty
636     \def\@oddhead{\slshape\rightmark}\hfil\thepage}%
637     \let\@mkboth\markboth
638     \def\chaptermark##1{%
639         \markright {\MakeUppercase{%
640             \ifnum \c@secnumdepth >\m@ne

```

```

641         \@chapapp\ \thechapter. \ %
642         \fi
643         ##1}}}}
644 \fi
645 \def\ps@myheadings{%
646     \let\@oddfoot\@empty\let\@evenfoot\@empty
647     \def\@evenhead{\thepage\hfil\slshape\leftmark}%
648     \def\@oddhead{\slshape\rightmark}\hfil\thepage}%
649     \let\@mkboth\@gobbletwo
650     \let\chaptermark\@gobble
651     \let\sectionmark\@gobble
652 }

```

5.11 Miscellaneous

5.11.1 \today Macro

```

653 \def\today{\ifcase\month\or
654     January\or February\or March\or April\or May\or June\or
655     July\or August\or September\or October\or November\or December\fi
656     \space\number\day, \number\year}

```

5.11.2 Equation and Eqnarray

Put here because it must follow \chapter definition \newcounter{equation}

```

657 \@addtoreset {equation}{chapter}% Makes \chapter reset 'equation' counter.
658 \renewcommand\theequation
659     {\ifnum \c@chapter>\z@ \thechapter.\fi \@arabic\c@equation}

```

5.11.3 Element Names (e.g., Contents, Index, Chapter, etc.)

Define names of elements

```

660 \newcommand\contentsname{Contents}
661 \newcommand\listfigurename{List of Figures}
662 \newcommand\listtablename{List of Tables}
663 \newcommand\bibname{References}
664 \newcommand\indexname{Index}
665 \newcommand\figurename{Figure}
666 \newcommand\tablename{Table}
667 \newcommand\partname{Part}
668 \newcommand\chaptername{Chapter}
669 \newcommand\appendixname{Appendix}
670 \newcommand\abstractname{Abstract}
671 \newcommand\acknowledgename{Acknowledgments}
672 \newcommand\dedicationname{Dedication}

```

5.11.4 Redefine T_EX Text Macros

Make old T_EX commands behave as LaTeX commands

```

673 \DeclareOldFontCommand{\rm}{\normalfont\rmfamily}{\mathrm}

```

```

674 \DeclareOldFontCommand{\sf}{\normalfont\sffamily}{\mathsf}
675 \DeclareOldFontCommand{\tt}{\normalfont\ttfamily}{\mathtt}
676 \DeclareOldFontCommand{\bf}{\normalfont\bfseries}{\mathbf}
677 \DeclareOldFontCommand{\it}{\normalfont\itshape}{\mathit}
678 \DeclareOldFontCommand{\sl}{\normalfont\slshape}{\@nomath\sl}
679 \DeclareOldFontCommand{\sc}{\normalfont\scshape}{\@nomath\sc}
680 \DeclareRobustCommand* \cal{\@fontswitch\relax\mathcal}
681 \DeclareRobustCommand* \mit{\@fontswitch\relax\mathnormal}

```

5.11.5 Code Environment

Same as verbatim except it is always in single spacing and double spacing is restored at the end

```

682 \begingroup \catcode '='=0 \catcode '['= 1
683 \catcode']'=2 \catcode '{'=12 \catcode '\]=12
684 \catcode'\=12 |gdef|@xcodex#1\end{code}[#1|end[code]]
685 |endgroup
686 \def\code{\par\renewcommand\baselinestretch{1}\@normalsize\@verbatim
687 \frenchspacing\@vobeyspaces \@xcodex}
688 \def\endcode{\renewcommand\baselinestretch{\@spacing}\@normalsize\endtrivlist}

```

5.11.6 Footnotes

Change it so that footnotes are printed in single spacing

```

689 \long\def\@footnotetext#1{\insert\footins{\renewcommand\baselinestretch{1}
690 \footnotesize
691 \interlinepenalty\interfootnotelinepenalty
692 \splittopskip\footnotesep
693 \splitmaxdepth \dp\strutbox \floatingpenalty \MM
694 \hsize\columnwidth \@parboxrestore
695 \edef\@currentlabel{\csname p@footnote\endcsname\@thefnmark}\@makefnctext
696 {\rule{\z@}{\footnotesep}\ignorespaces
697 #1\strut}\renewcommand\baselinestretch{\@spacing}}

```

5.12 Initialization

Default initializations

```

698 \ps@plain % 'plain' page style
699 \pagenumbering{arabic} % Arabic page numbers
700 \onecolumn % Single-column.
701 \if@twoside\else\raggedbottom\fi % Ragged bottom unless twoside option.

```

5.13 Preliminary Pages

Generate thesis preliminary pages.

NEEDSWORK: This `singlespacing` test always fails, even when `ucdavisthesis.cls` is loaded.

```

702 \def\@stdsinglespacing{1.0}

```

```

703 \ifx\@singlespacing\@stdsinglespacing
704 % Spacing has already been set (in ucdavisthesis.cls).
705 \else
706 % Spacing was not set, set it here as if we were ucdavisthesis.cls.
707 % \typeout{Spacing not set.}
708 \def\@singlespacing{1.0}
709 \def\@doublespacing{1.5} % see above for explanation of value
710 \let\@spacing=\@singlespacing
711 \fi

```

The following macro pair save and restore `twocolumn` status.

```

712 \newif\if@ColumnSaveValue
713 \newcommand{\ColumnSave}{
714   \if@twocolumn
715     \@ColumnSaveValue>true
716   \else
717     \@ColumnSaveValue>false
718   \fi
719   \pagebreak
720   \onecolumn
721 }
722 \newcommand{\ColumnSaveHeading}[1]{
723   \if@twocolumn
724     \@ColumnSaveValue>true
725     \pagebreak
726     \twocolumn[#1]
727   \else
728     \@ColumnSaveValue>false
729     \pagebreak
730     #1
731   \fi
732 }
733 \newcommand{\ColumnRestore}{\if@ColumnSaveValue\twocolumn\fi}

```

5.13.1 Title Page

```

734 \newcommand\@maketitlepage{
735   \begin{titlepage}
736     \renewcommand\baselinestretch{\@singlespacing}
737     \ColumnSave
738     \begin{center}
739       \leavevmode\vfil
740       \@titlesize{\@title} \\\ \bigskip
741       \normalsize By \\\ \bigskip
742       \textsc{\@author} \\\
743       \@authordegrees \\\ \bigskip
744       \textsc{\@Thesisname} \\\ \bigskip
745       Submitted in partial satisfaction of the requirements
746       for the degree of \\\ \bigskip
747       \textsc{\@degreename} \\\ \bigskip

```

```

748         in \\ \bigskip
749         \@officialmajor \\ \bigskip
750         in the \\ \bigskip
751         \textsc{Office of Graduate Studies} \\ \bigskip
752         of the \\ \bigskip
753         \textsc{University of California} \\ \bigskip
754         \textsc{Davis} \\ \bigskip\bigskip
755         Approved: \\ \vspace{20pt}
756         \textit{\@memberone}\\ \vspace{-9pt}
757         \rule{3in}{1pt} \\ \vspace{14pt}
758         \textit{\@membertwo}\\ \vspace{-9pt}
759         \rule{3in}{1pt} \\ \vspace{14pt}
760         \textit{\@memberthree}\\ \vspace{-9pt}
761         \rule{3in}{1pt} \\ \medskip
762         Committee in Charge \\ \bigskip
763         \@degreeyear \\
764         \vfil
765     \end {center}
766     \ColumnRestore
767 \end{titlepage}
768 }

```

5.13.2 Copyright Page

The Copyright page does not get numbered or counted in numbering.

```

769 \newif\if@copyright
770 \@copyrighttrue
771 \newcommand\nocopyright{\@copyrightfalse}
772 \def\@copyrightinfo{All rights reserved.}
773 \newcommand\copyrightinfo[1]{\def\@copyrightinfo{#1}}
774 \newcommand\@makecopyrightpage{%
775     \if@copyright
776         \thispagestyle{empty}
777         \ColumnSave
778         \null
779         \vfill
780         \begin{center}
781             \normalsize \normalfont Copyright \copyright\
782             \ifx\@copyrightyear\@degreeyear \@degreeyear\else
783             \@copyrightyear \fi\ by \\
784             \@author \\
785             \emph{\@copyrightinfo}
786         \end{center}
787         \ColumnRestore
788         % Increment page number if onside
789         \if@twoside\else\addtocounter{page}{-1}\fi
790     \else
791         \relax % don't create copyright page
792     \fi
793 }

```

5.13.3 Dedication Page

```
794 \newif\if@dedication
795 \def\@dedication{}
796 \newcommand\dedication[1]{\@dedicationtrue\def\@dedication{#1}}
797 \newcommand\@makededication{
798   \if@dedication
799     \@mkboth{\dedicationname}{\dedicationname}
800     \ColumnSave
801     \par
802     \renewcommand\baselinestretch{\@spacing}\@normalsize\normalfont
803     \vspace*{0pt}      % force spacing at top of page
804     \vfill
805     \begin{center}
806       \@dedication
807     \end{center}
808     \vfill\vfill % put about 1:2 (above:below) dedication
809     \ColumnRestore
810   \fi
811 }
```

5.13.4 Abstract Page

```
812 \newif\if@abstract
813 \def\@abstract{}
814 \newcommand\abstract[1]{\@abstracttrue\def\@abstract{#1}}
```

This has one argument: the `baselinestretch`

The UCD Format requires doublespacing

```
815 \newcommand{\@makeabstractpage}[1]{%
816   \if@abstract
817     \@mkboth{\abstractname}{\abstractname}
818     \addcontentsline{toc}{section}{\abstractname}%
819     \ColumnSave
820     \par
821     \begin{center}
822       \textsc{\large \abstractname\ of the \@Thesisname}\ \bigskip
823       \textbf{\@title} % \textsb?
824     \end{center}
825     \ifx\@spacing\@doublespacing\bigskip\smallskip\else\bigskip\fi
826     \renewcommand\baselinestretch{#1}\@normalsize
```

Set up spacing. If it's single spacing, indent the margins. If double spacing is required than things are already ugly enough (and we loose enough space) that we may as well use the whole `\textwidth`.

```
827   \ifthenelse{\equal{#1}{\@stdsinglespacing}}{%
828     \begin{center}
829       \begin{minipage}{4.75in}
830         \setlength{\parindent}{1.5em}
831         \@abstract
832       \end{minipage}
833     \end{center}
```

```

834     }{%
835     \@abstract
836     }
837     \vfill
838     \renewcommand\baselinestretch{\@spacing}\@normalsize
839     \ColumnRestore
840 \else
841     \typeout{No abstract.}
842 \fi\newpage
843 }

```

5.13.5 Acknowledgments Page

```

844 \newif\if@acks
845 \def\@acknowledgments{}
846 \newcommand\acknowledgments[1]{\@ackstrue\def\@acknowledgments{#1}}
847 \newcommand\@makeackheading{%
848 {
849   \centering
850   \textsc{\large \acknowledgename}
851   \vskip 12pt
852 }
853 }
854 \newcommand\@makeacknowledgments{%
855   \if@acks
856     \@mkboth{\acknowledgename}{\acknowledgename}
857     \addcontentsline{toc}{section}{\acknowledgename}%
858     \ColumnSaveHeading{\@makeackheading}
859     \par
860     \renewcommand\baselinestretch{\@spacing}\@normalsize
861     \noindent \normalsize \normalfont \@acknowledgments
862     \vfill
863     \ColumnRestore
864 \fi\newpage
865 }

```

5.13.6 Print All Preliminary Pages

```

866 \newcommand\makeintropages{%
867   % Preliminary page style (lowercase roman numbers at bottom of page)
868   \pagenumbering{roman}\pagestyle{prelim}
869   \@maketitlepage

```

If we're printing two sided and there is no copyright page, insert a blank page for the back of the title page. NOTE: This extra page makes the output non-conforming to the UCD Format, unless you throw it away.

```

870 \if@twoside
871   \if@copyright
872   \else
873     \typeout{Two-side detected, blank page added after title page.}
874     \null\thispagestyle{empty}\newpage % the back side of the title page
875 \fi

```

```

876 \fi
877 \@makecopyrightpage
878 \@makededication
879 \tableofcontents
880 \listoffigures\newpage
881 \listoftables\newpage
882 \@makeabstractpage{\@doublespacing}
883 \@makeacknowledgments
884 \@prelimpagesfalse\newpage % end of preliminary pages, start a new page
885 \if@twoside
886     \ifthenelse{\isodd{\value{page}}}{%
887         {}
888         % create a blank page if prelim pages has an odd number of pages
889         {\thispagestyle{empty}\null\newpage}
890 \fi
891 % change pagestyle to thshead (arabic page number in upper right)
892 \pagenumbering{arabic}\pagestyle{thshead}
893 }

```

5.13.7 UMI Abstract

Create a UMI compliant abstract

```

894 % hold current page number when creating the UMI abstract
895 \newcounter{UMIpagetemp}
896 \newenvironment{UMImargins}{%
897     \begin{list}{}{%
898         \setlength{\topsep}{0pt}%
899         \setlength{\leftmargin}{0in}%
900         \setlength{\rightmargin}{0in}%
901         \setlength{\listparindent}{\parindent}%
902         \setlength{\itemindent}{\parindent}%
903         \setlength{\parsep}{\parskip}%
904     }%
905     \item[]{\end{list}}
906 \newcommand\UMIabstract[1][\@abstract]{%
907 \if@twoside
908     \typeout{Two-side detected, UMI Abstract not printed in this mode.}
909     \relax
910 \else
911     \newpage % begin abstract on a new page
912     \setcounter{UMIpagetemp}{\value{page}} % save the current page number
913     \setcounter{page}{1} % number pages in the abstract starting at 1
914     \pagestyle{UMIheadings} % page numbers in upper right with surrounding dashes
915     \thispagestyle{empty} % no page number on the first page
916 \begin{UMImargins}
917     \begin{flushright}
918         \renewcommand\baselinestretch{\@singlespacing}
919         \normalsize \normalfont \@author \\
920         \@degreemonth\ \@degreeyear \\
921         \@graduateprogram \\ \bigskip

```

```

922     \end{flushright}
923     \begin{center}
924         \@title \ \bigskip
925         \textbf{\underline{Abstract}}
926     \end{center}
927     \renewcommand\baselinestretch{%
928     \@doublespacing}\noindent#1 % Doublespaced abstract
929 \end{UMImargins}
930 \renewcommand\baselinestretch{%
931 %return to previous spacing, clear rest of page
932 \@spacing}\@normalsize\newpage
933 \pagestyle{thshead} % return to standard page headings
934 % return the page counter to previous value
935 \setcounter{page}{\value{UMIpagetemp}}
936 \fi}
937 % end of |ucdavisthesis.cls|
938 </class>

```

6 Implementation and Source Code Listing for the Class Option Files

This section documents the code that is processed by DOCSTRIP into the class option files (.cls). After processing, there are four files; one for each of the font size options (10pt, 11pt, 12pt, and 13pt). The option files contain the font size information and any L^AT_EX lengths that are font size dependent.

```

939 <*ucdxxpt>
940 \lineskip 1pt           % \lineskip is 1pt for all font sizes.
941 \normallineskip 1pt
942 \renewcommand\baselinestretch{\@spacing} % single or double spacing

```

6.1 Font Sizes

Each size-changing command `\SIZE` executes the command `\@setsize\SIZE{BASELINESKIP}\FONTSIZE\@FONTSIZE` where:

`BASELINESKIP` Normal value of `\baselineskip` for that size. (Actual value will be `\baselinestretch × BASELINESKIP`.)

`\FONTSIZE` Name of font-size command. The currently available (preloaded) font sizes are: `\vpt` (5pt), `\vipt` (6pt), `\viipt` (etc.), `\viiipt`, `\ixpt`, `\xpt`, `\xipt`, `\xiipt`, `\xivpt`, `\xvipt`, `\xxpt`, `\xxvpt`.

`\@FONTSIZE` The same as the font-size command except with an @ in front—e.g., if `\FONTSIZE = \xivpt` then `\@FONTSIZE = \@xivpt`.

For reasons of efficiency that needn't concern the designer, the document class defines `\@normalsize` instead of `\normalsize`. This is done only for `\normalsize`, not for any other size-changing commands.

NOTE: All line spacings have been set to the nominal value times 1.3 (e.g., 15.6pt for 12-point type). If you change this spacing, you must make a corresponding change to the `\@doublespacing` value in the `ucdavisthesis.cls` file.

Font sizes are generally taken from L^AT_EX 2_ε's `sizexx.clo`.

```

943 \renewcommand\normalsize{%
944 <*ucd10pt>
945   \@setfontsize\normalsize\@xpt\@xipt
946   \abovedisplayskip 10\p@ \@plus2\p@ \@minus5\p@
947   \abovedisplayshortskip \z@ \@plus3\p@
948   \belowdisplayshortskip 6\p@ \@plus3\p@ \@minus3\p@
949 </ucd10pt>
950 <*ucd11pt>
951   \@setfontsize\normalsize\@xipt{13.6}%
952   \abovedisplayskip 11\p@ \@plus3\p@ \@minus6\p@
953   \abovedisplayshortskip \z@ \@plus3\p@
954   \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
955 </ucd11pt>
956 <*ucd12pt>
957   \@setfontsize\normalsize\@xipt{14.5}%
958   \abovedisplayskip 12\p@ \@plus3\p@ \@minus7\p@
959   \abovedisplayshortskip \z@ \@plus3\p@
960   \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
961 </ucd12pt>
962 <*ucd13pt>
963   \@setfontsize\normalsize{13}{15.6}%
964   \abovedisplayskip 13\p@ \@plus3\p@ \@minus7\p@
965   \abovedisplayshortskip \z@ \@plus3\p@
966   \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
967 </ucd13pt>
968   \belowdisplayskip \abovedisplayskip
969   \let\@listi\@listI}
970 %
971 \newcommand\small{%
972 <*ucd10pt>
973   \@setfontsize\small\@ixpt{11}%
974   \abovedisplayskip 8.5\p@ \@plus3\p@ \@minus4\p@
975   \abovedisplayshortskip \z@ \@plus2\p@
976   \belowdisplayshortskip 4\p@ \@plus2\p@ \@minus2\p@
977   \def\@listi{\leftmargin\leftmarginI
978             \topsep 4\p@ \@plus2\p@ \@minus2\p@
979             \parsep 2\p@ \@plus\p@ \@minus\p@
980 </ucd10pt>
981 <*ucd11pt>
982   \@setfontsize\small\@xpt\@xipt
983   \abovedisplayskip 10\p@ \@plus2\p@ \@minus5\p@
984   \abovedisplayshortskip \z@ \@plus3\p@

```

```

985 \belowdisplayshortskip 6\p@ \@plus3\p@ \@minus3\p@
986 \def\@listif\leftmargin\leftmargini
987 \topsep 6\p@ \@plus2\p@ \@minus2\p@
988 \parsep 3\p@ \@plus2\p@ \@minus\p@
989 </ucd11pt>
990 <*ucd12pt>
991 \@setfontsize\small\@xipt{13.6}%
992 \abovedisplayskip 11\p@ \@plus3\p@ \@minus6\p@
993 \abovedisplayshortskip \z@ \@plus3\p@
994 \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
995 \def\@listif\leftmargin\leftmargini
996 \topsep 9\p@ \@plus3\p@ \@minus5\p@
997 \parsep 4.5\p@ \@plus2\p@ \@minus\p@
998 </ucd12pt>
999 <*ucd13pt>
1000 \@setfontsize\small\@xiipt{14.5}%
1001 \abovedisplayskip 11.5\p@ \@plus3\p@ \@minus6\p@
1002 \abovedisplayshortskip \z@ \@plus3\p@
1003 \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
1004 \def\@listif\leftmargin\leftmargini
1005 \topsep 9\p@ \@plus3\p@ \@minus5\p@
1006 \parsep 4.5\p@ \@plus2\p@ \@minus\p@
1007 </ucd13pt>
1008 \itemsep \parsep}%
1009 \belowdisplayskip \abovedisplayskip
1010 }
1011 %
1012 \newcommand\footnotesize{%
1013 <*ucd10pt>
1014 \@setfontsize\footnotesize\@viipt{9.5}%
1015 \abovedisplayskip 6\p@ \@plus2\p@ \@minus4\p@
1016 \abovedisplayshortskip \z@ \@plus\p@
1017 \belowdisplayshortskip 3\p@ \@plus\p@ \@minus2\p@
1018 \def\@listif\leftmargin\leftmargini
1019 \topsep 3\p@ \@plus\p@ \@minus\p@
1020 \parsep 2\p@ \@plus\p@ \@minus\p@
1021 </ucd10pt>
1022 <*ucd11pt>
1023 \@setfontsize\footnotesize\@ixpt{11}%
1024 \abovedisplayskip 8\p@ \@plus2\p@ \@minus4\p@
1025 \abovedisplayshortskip \z@ \@plus\p@
1026 \belowdisplayshortskip 4\p@ \@plus2\p@ \@minus2\p@
1027 \def\@listif\leftmargin\leftmargini
1028 \topsep 4\p@ \@plus2\p@ \@minus2\p@
1029 \parsep 2\p@ \@plus\p@ \@minus\p@
1030 </ucd11pt>
1031 <*ucd12pt>
1032 \@setfontsize\footnotesize\@xpt\@xipt
1033 \abovedisplayskip 10\p@ \@plus2\p@ \@minus5\p@
1034 \abovedisplayshortskip \z@ \@plus3\p@

```

```

1035 \belowdisplayshortskip 6\p@ \@plus3\p@ \@minus3\p@
1036 \def\@listif\leftmargin\leftmargini
1037 \topsep 6\p@ \@plus2\p@ \@minus2\p@
1038 \parsep 3\p@ \@plus2\p@ \@minus\p@
1039 </ucd12pt>
1040 <*ucd13pt>
1041 \@setfontsize\footnotesize\@xpt\@xipt
1042 \abovedisplayskip 10\p@ \@plus2\p@ \@minus5\p@
1043 \abovedisplayshortskip \z@ \@plus3\p@
1044 \belowdisplayshortskip 6\p@ \@plus3\p@ \@minus3\p@
1045 \def\@listif\leftmargin\leftmargini
1046 \topsep 6\p@ \@plus2\p@ \@minus2\p@
1047 \parsep 3\p@ \@plus2\p@ \@minus\p@
1048 </ucd13pt>
1049 \itemsep \parsep}%
1050 \belowdisplayskip \abovedisplayskip
1051 }
1052 %
1053 <*ucd10pt>
1054 \newcommand\scriptsize{\@setfontsize\scriptsize\@viipt\@viiipt}
1055 \newcommand\tiny{\@setfontsize\tiny\@vpt\@viipt}
1056 \newcommand\large{\@setfontsize\large\@xiipt{14}}
1057 \newcommand\Large{\@setfontsize\Large\@xivpt{18}}
1058 \newcommand\LARGE{\@setfontsize\LARGE\@xviipt{22}}
1059 \newcommand\huge{\@setfontsize\huge\@xxpt{25}}
1060 \newcommand\Huge{\@setfontsize\Huge\@xxvpt{30}}
1061 </ucd10pt>
1062 <*ucd11pt>
1063 \newcommand\scriptsize{\@setfontsize\scriptsize\@viipt{9.5}}
1064 \newcommand\tiny{\@setfontsize\tiny\@viipt\@viipt}
1065 \newcommand\large{\@setfontsize\large\@xiipt{14}}
1066 \newcommand\Large{\@setfontsize\Large\@xivpt{18}}
1067 \newcommand\LARGE{\@setfontsize\LARGE\@xviipt{22}}
1068 \newcommand\huge{\@setfontsize\huge\@xxpt{25}}
1069 \newcommand\Huge{\@setfontsize\Huge\@xxvpt{30}}
1070 </ucd11pt>
1071 <*ucd12pt>
1072 \newcommand\scriptsize{\@setfontsize\scriptsize\@viipt{9.5}}
1073 \newcommand\tiny{\@setfontsize\tiny\@viipt\@viipt}
1074 \newcommand\large{\@setfontsize\large\@xivpt{18}}
1075 \newcommand\Large{\@setfontsize\Large\@xviipt{22}}
1076 \newcommand\LARGE{\@setfontsize\LARGE\@xxpt{25}}
1077 \newcommand\huge{\@setfontsize\huge\@xxvpt{30}}
1078 \newcommand\Huge{\@setfontsize\Huge{29.86}{35}}
1079 </ucd12pt>
1080 <*ucd13pt>
1081 \newcommand\scriptsize{\@setfontsize\scriptsize\@viipt{9.5}}
1082 \newcommand\tiny{\@setfontsize\tiny\@viipt\@viipt}
1083 \newcommand\large{\@setfontsize\large\@xviipt{22}}
1084 \newcommand\Large{\@setfontsize\Large\@xxpt{25}}

```

```

1085 \newcommand\LARGE{\@setfontsize\LARGE\@xxvpt{30}}
1086 \newcommand\huge{\@setfontsize\huge{29.86}{35}}
1087 \newcommand\Huge{\@setfontsize\Huge{35.83}{40}}
1088 </ucd13pt>
1089 %
1090 \setlength\smallskipamount{3\p@ \@plus 1\p@ \@minus 1\p@}
1091 \setlength\medskipamount{6\p@ \@plus 2\p@ \@minus 2\p@}
1092 \setlength\bigskipamount{12\p@ \@plus 4\p@ \@minus 4\p@}
1093 %
1094 \normalsize % Choose the normalsize font.

```

6.2 Footnotes

`\footnotesep` = Height of strut placed at the beginning of every footnote = height of normal `\footnotesize` strut, so no extra space between footnotes.

`\skip\footins` = Space between last line of text and top of first footnote.

```

1095 <*ucd10pt>
1096 \setlength\footnotesep{6.65\p@}%
1097 \setlength{\skip\footins}{9\p@ \@plus 4\p@ \@minus 2\p@}%
1098 </ucd10pt>
1099 <*ucd11pt>
1100 \setlength\footnotesep{7.7\p@}%
1101 \setlength{\skip\footins}{10\p@ \@plus 4\p@ \@minus 2\p@}%
1102 </ucd11pt>
1103 <*ucd12pt>
1104 \setlength\footnotesep{8.4\p@}%
1105 \setlength{\skip\footins}{10.8\p@ \@plus 9\p@ \@minus 2\p@}%
1106 </ucd12pt>
1107 <*ucd13pt>
1108 \setlength\footnotesep{8.4\p@}%
1109 \setlength{\skip\footins}{10.8\p@ \@plus 9\p@ \@minus 2\p@}%
1110 </ucd13pt>

```

6.3 Floats

A float is something like a figure or table. For floats on a text page: both one-column mode or single-column floats in two-column mode.

`\floatsep` = Space between adjacent floats moved to top or bottom of text page.

`\textfloatsep` = Space between main text and floats at top or bottom of page.

`\intextsep` = Space between in-text figures and text.

```

1111 <*ucd10pt>
1112 \setlength\floatsep {12\p@ \@plus 2\p@ \@minus 2\p@}%
1113 \setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}%
1114 \setlength\intextsep{12\p@ \@plus 2\p@ \@minus 2\p@}%
1115 </ucd10pt>
1116 <*ucd11pt>
1117 \setlength\floatsep{13\p@ \@plus 2\p@ \@minus 3\p@}%
1118 \setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}%

```

```

1119 \setlength\intertextsep{13\p@ \@plus 4\p@ \@minus 3\p@}%
1120 </ucd11pt>
1121 <*ucd12pt>
1122 \setlength\floatsep{14\p@ \@plus 2\p@ \@minus 4\p@}%
1123 \setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}%
1124 \setlength\intertextsep{14\p@ \@plus 4\p@ \@minus 4\p@}%
1125 </ucd12pt>
1126 <*ucd13pt>
1127 \setlength\floatsep{14\p@ \@plus 2\p@ \@minus 4\p@}%
1128 \setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}%
1129 \setlength\intertextsep{14\p@ \@plus 4\p@ \@minus 4\p@}%
1130 </ucd13pt>

```

For floats on a separate float page or column: one-column mode or single-column floats in two-column mode.

```

1131 % Stretch at top of float page/column. (Must be Opt plus ...)
1132 \setlength\@fptop{0\p@ \@plus 1fil}%
1133 %
1134 % Space between floats on float page/column.
1135 \setlength\@fpsep{8\p@ \@plus 2fil}%
1136 %
1137 % Stretch at bottom of float page/column. (Must be Opt plus ... )
1138 \setlength\@fpbot{0\p@ \@plus 1fil}%

```

6.4 Paragraphing

`\parskip` = Extra vertical space between paragraphs (default is 0).

`\parindent` = Width of paragraph indentation.

`\topsep` = Extra vertical space, in addition to `\parskip`, added above and below list and paragraphing environments.

`\partopsep` = Extra vertical space, in addition to `\parskip` and `\topsep`, added when user leaves blank line before environment.

`\itemsep` = Extra vertical space, in addition to `\parskip`, added between list items.

```

1139 <*ucd10pt>
1140 \setlength\parskip{0\p@ \@plus \p@}
1141 \setlength\parindent{15\p@}
1142 \setlength\topsep{10pt plus 4pt minus 6pt}
1143 \setlength\partopsep{3pt plus 2pt minus 2pt}
1144 \setlength\itemsep{5pt plus 2.5pt minus 1pt}
1145 </ucd10pt>
1146 <*ucd11pt>
1147 \setlength\parskip{0\p@ \@plus \p@}
1148 \setlength\parindent{17\p@}
1149 \setlength\topsep{10pt plus 4pt minus 6pt}
1150 \setlength\partopsep{3pt plus 2pt minus 2pt}
1151 \setlength\itemsep{5pt plus 2.5pt minus 1pt}
1152 </ucd11pt>

```

```

1153 <*ucd12pt>
1154 \setlength\parskip{0\p@ \@plus \p@}
1155 \setlength\parindent{1.5em}
1156 \setlength\topsep{10pt plus 4pt minus 6pt}
1157 \setlength\partopsep{3pt plus 2pt minus 2pt}
1158 \setlength\itemsep{5pt plus 2.5pt minus 1pt}
1159 </ucd12pt>
1160 <*ucd13pt>
1161 \setlength\parskip{0\p@ \@plus \p@}
1162 \setlength\parindent{1.5em}
1163 \setlength\topsep{10pt plus 4pt minus 6pt}
1164 \setlength\partopsep{3pt plus 2pt minus 2pt}
1165 \setlength\itemsep{5pt plus 2.5pt minus 1pt}
1166 </ucd13pt>

```

6.5 Page Breaking Penalties

```

1167 \@lowpenalty 51 % Produced by \nopagebreak[1] or \nolinebreak[1]
1168 \@medpenalty 151 % Produced by \nopagebreak[2] or \nolinebreak[2]
1169 \@highpenalty 301 % Produced by \nopagebreak[3] or \nolinebreak[3]
1170 %
1171 \@beginparpenalty -\@lowpenalty % Before a list or paragraph environment.
1172 \@endparpenalty -\@lowpenalty % After a list or paragraph environment.
1173 \@itempenalty -\@lowpenalty % Between list items.
1174 %
1175 % \clubpenalty % 'Club line' at bottom of page.
1176 % \widowpenalty % 'Widow line' at top of page.
1177 % \displaywidowpenalty % Math display widow line.
1178 % \preddisplaypenalty % Breaking before a math display.
1179 % \postdisplaypenalty % Breaking after a math display.
1180 % \interlinepenalty % Breaking at a line within a paragraph.
1181 % \brokenpenalty % Breaking after a hyphenated line.
1182 </ucdxxpt>

```

Change History

v0.8	General: Initial version. Still working out bugs. 1	bering problem. Fixed typos in documentation. 1
v0.9	General: First full implementation. Fixed UMI abstract and page number location. 1	General: Release version. UMI abstract left margin fixed. Added singlespacing and committee commands. 1
v0.99	General: Fixed prelim page num-	

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