

Using LaTeX for AFIT Thesis Generation



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The Art of Typesetting



**Whether you use an interface like Microsoft Word
or a typesetting system like LaTeX...**

**When you create a digital document,
you are writing a program!**

**The larger the program the more bugs it has
and the more likely the program will encounter a catastrophic error.**

**Typesetting systems limit the new lines of code generated and
produce a cleaner, easier-to-debug document.**

TeX is a typesetting system developed by Dr Donald E. Knuth, author of the seminal multi-volume “The Art of Computer Programming”.

Two goals of TeX

- 1. Allow anyone to produce high quality books using a reasonable amount of effort**
- 2. Provide a system that can reproduce the same results in the future.**

Very popular in academia where high quality and affordability in publishing is a must.

Advantages

- **Scalability!**
- **Portable!**
- **Reusable.** Great ease in reformatting output
- **High quality typesetting, esp. mathematical symbols, graphics**
- **Free!** Excellent tools; all major operating systems supported

Disadvantages

- **Complex workflow**
- **Learning LaTeX markup language**
- **Must develop skill of reading and debugging code**
- **Some on-the-fly reformatting only LaTeX gurus should try...**



Installing LaTeX



- **TeX distribution**

Windows proTeXt 3.1, MiKTeX 2.9

Linux TeX Live 2014

Mac OS X MacTeX 2014

- **Text editor/compiler**

Windows TeXnicCenter 2.02, WinEdt 8.2

Linux Kile 2.1.3

Mac OS X TeXShop 3.36 (also 2.47)

Cross platform TeXworks 0.4.5

- **WYSIWYG editor**

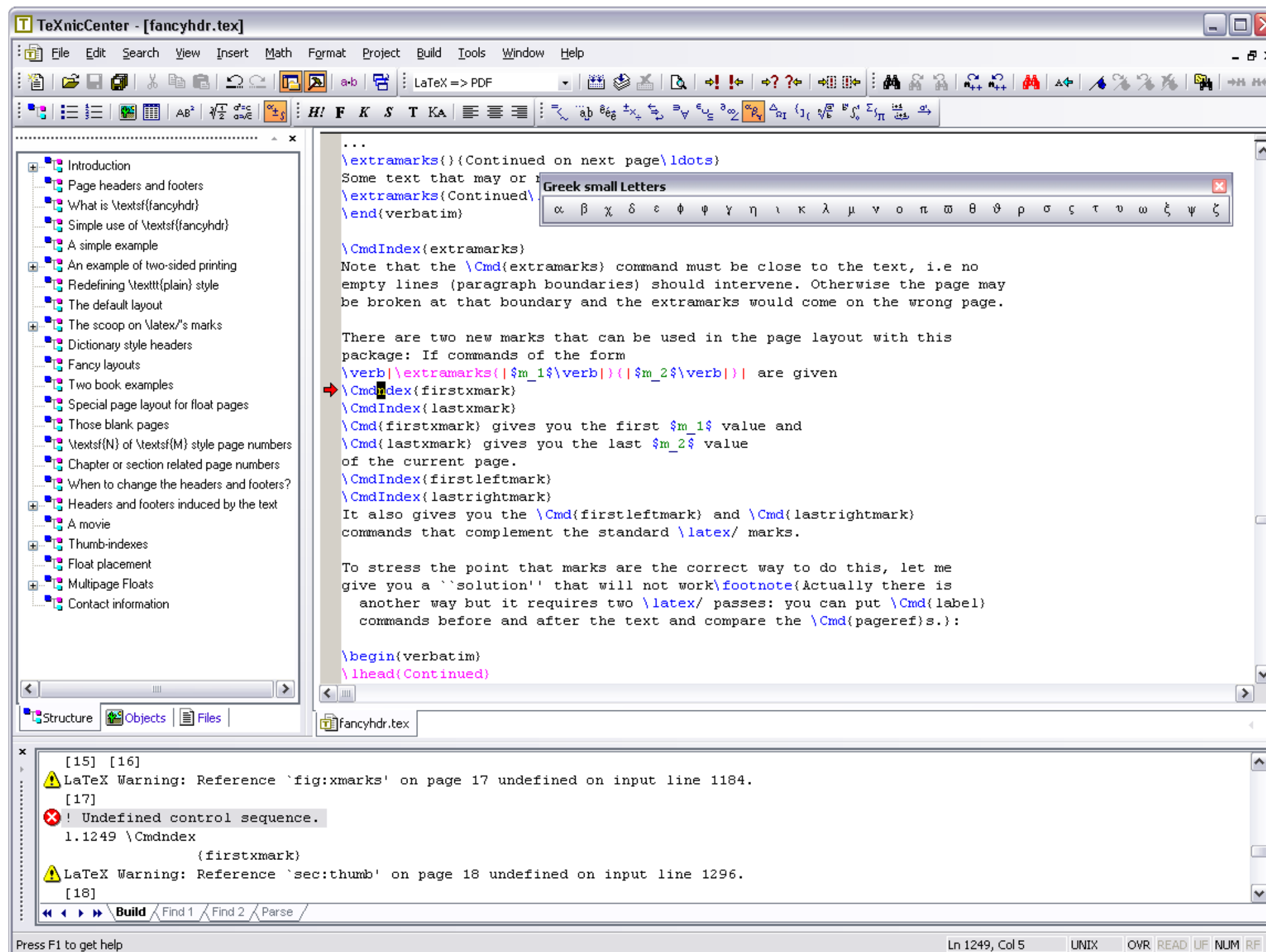
Windows Scientific Word

Cross platform LyX

- **Text editor: emacs**

► **Look for editors with syntax highlighting for tex files**

Resource: www.tug.org



The screenshot shows the TeXnicCenter application window titled "TeXnicCenter - [fancyhdr.tex]". The interface includes a menu bar (File, Edit, Search, View, Insert, Math, Format, Project, Build, Tools, Window, Help), a toolbar, and a main editing area. On the left, a "Structure" pane lists document sections like "Introduction", "Page headers and footers", and "Contact information".

The main editing area displays LaTeX code. A popup menu titled "Greek small Letters" is open, showing a list of Greek characters: α , β , χ , δ , ϵ , ϕ , ψ , γ , η , ι , κ , λ , μ , ν , \omicron , π , ϖ , θ , ϑ , ρ , σ , ς , τ , υ , ω , ξ , ψ , ζ .

The LaTeX code in the editor includes:

```

...
\extramarks(){Continued on next page\ldots}
Some text that may or
\extramarks{Continued}
\end{verbatim}

\CmdIndex{extramarks}
Note that the \Cmd{extramarks} command must be close to the text, i.e no
empty lines (paragraph boundaries) should intervene. Otherwise the page may
be broken at that boundary and the extramarks would come on the wrong page.

There are two new marks that can be used in the page layout with this
package: If commands of the form
\verb|\extramarks{|\$m_1$\verb|}{|\$m_2$\verb|}| are given
\CmdIndex{firstxmark}
\CmdIndex{lastxmark}
\Cmd{firstxmark} gives you the first \$m_1$ value and
\Cmd{lastxmark} gives you the last \$m_2$ value
of the current page.
\CmdIndex{firstleftmark}
\CmdIndex{lastrightmark}
It also gives you the \Cmd{firstleftmark} and \Cmd{lastrightmark}
commands that complement the standard \latex/ marks.

To stress the point that marks are the correct way to do this, let me
give you a ``solution'' that will not work\footnote{Actually there is
another way but it requires two \latex/ passes: you can put \Cmd{label}
commands before and after the text and compare the \Cmd{pageref}s.):

\begin{verbatim}
\lhead{Continued}

```

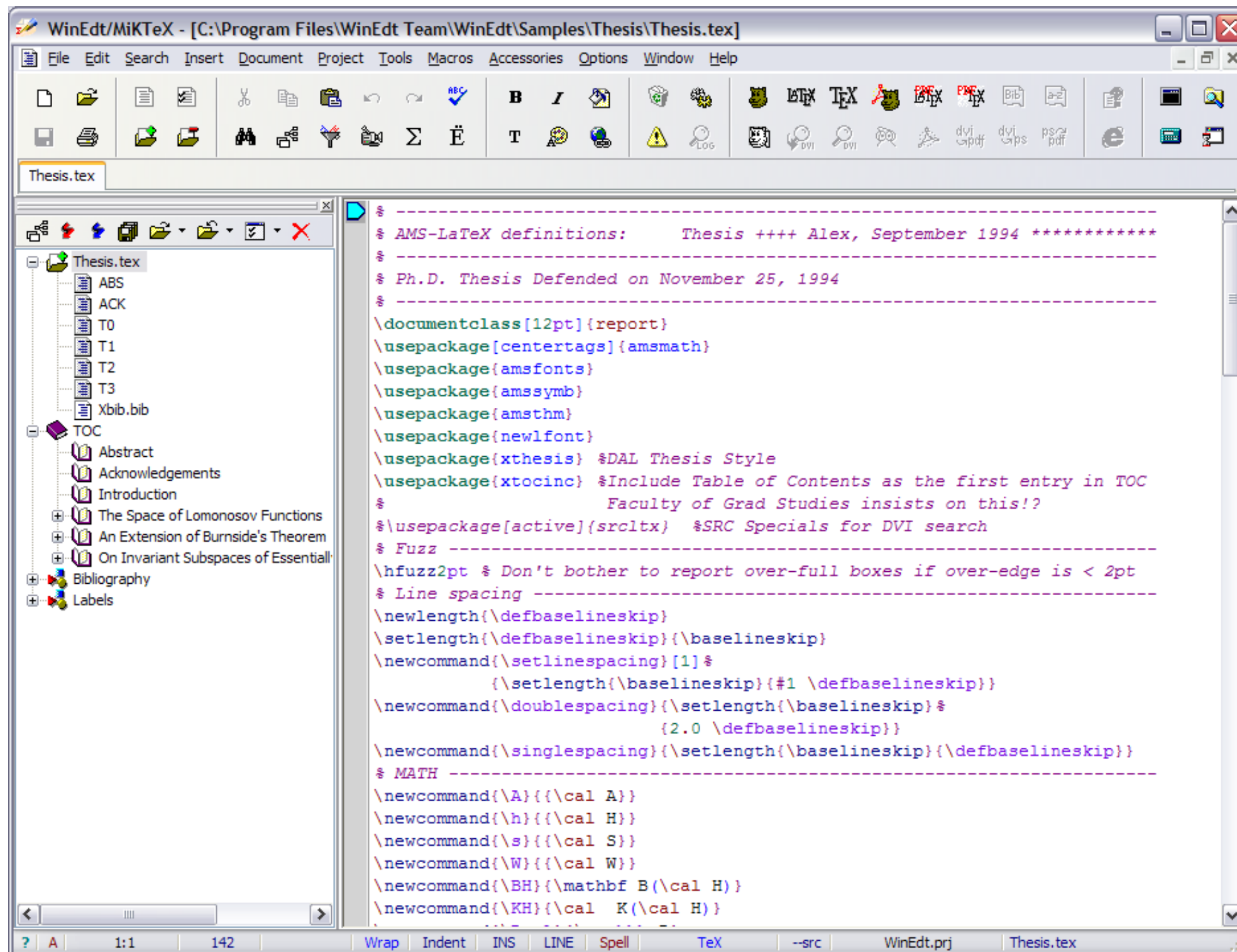
The bottom pane shows the LaTeX log output with the following messages:

```

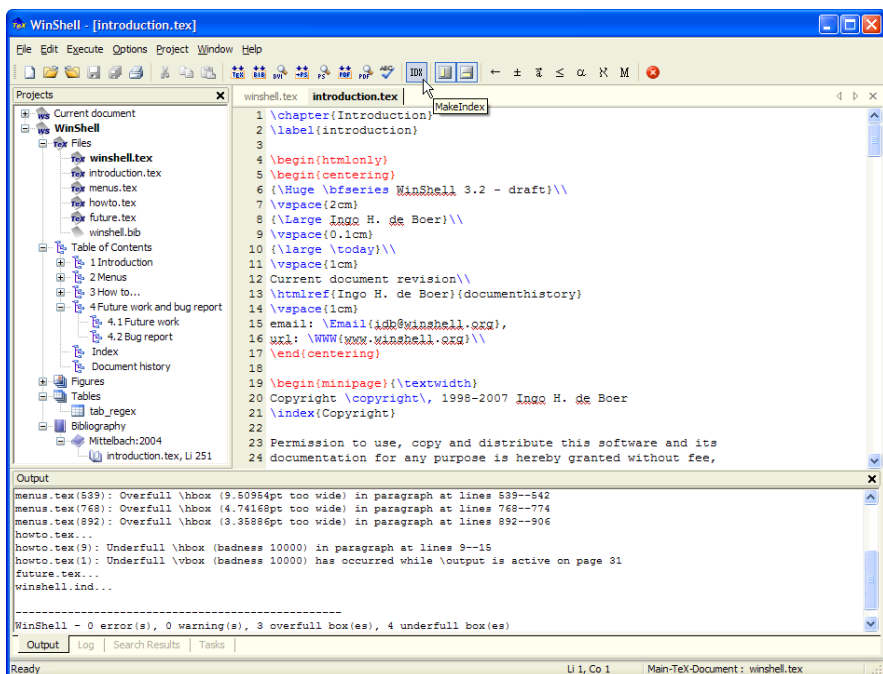
[15] [16]
LaTeX Warning: Reference 'fig:xmarks' on page 17 undefined on input line 1184.
[17]
! Undefined control sequence.
1.1249 \Cmdndex
      {firstxmark}
LaTeX Warning: Reference 'sec:thumb' on page 18 undefined on input line 1296.
[18]

```

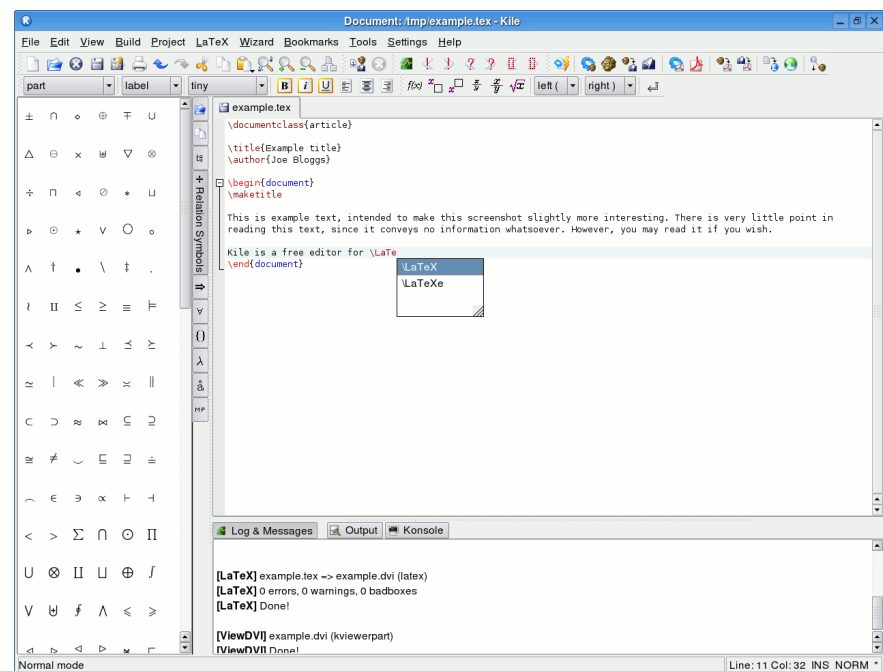
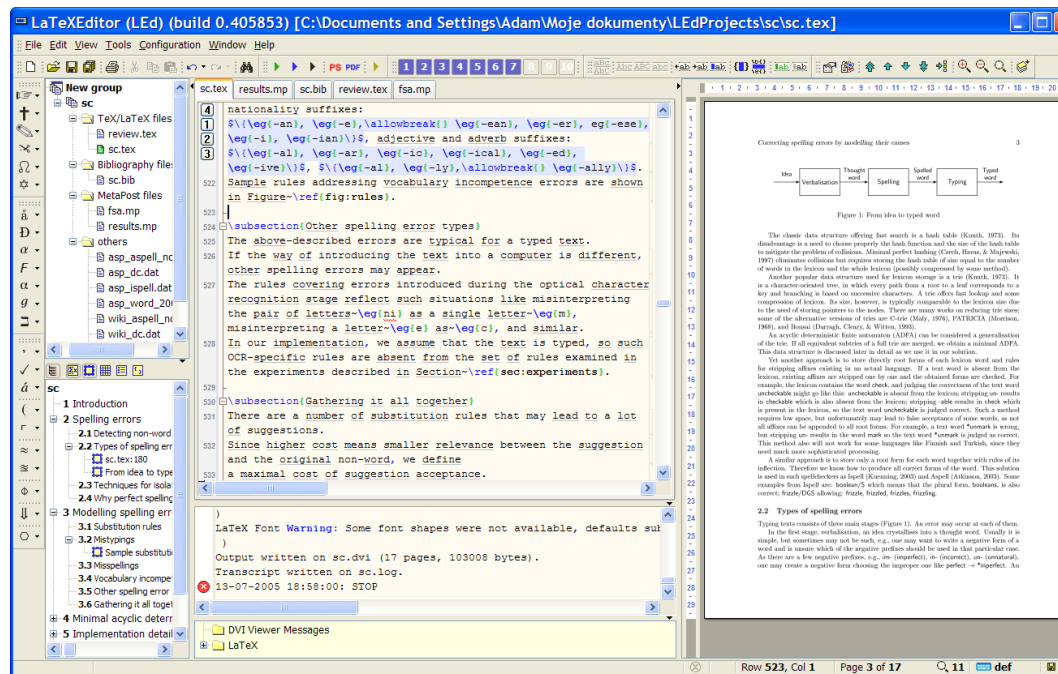
The status bar at the bottom indicates "Ln 1249, Col 5" and "UNIX OVR READ UF NUM RF".



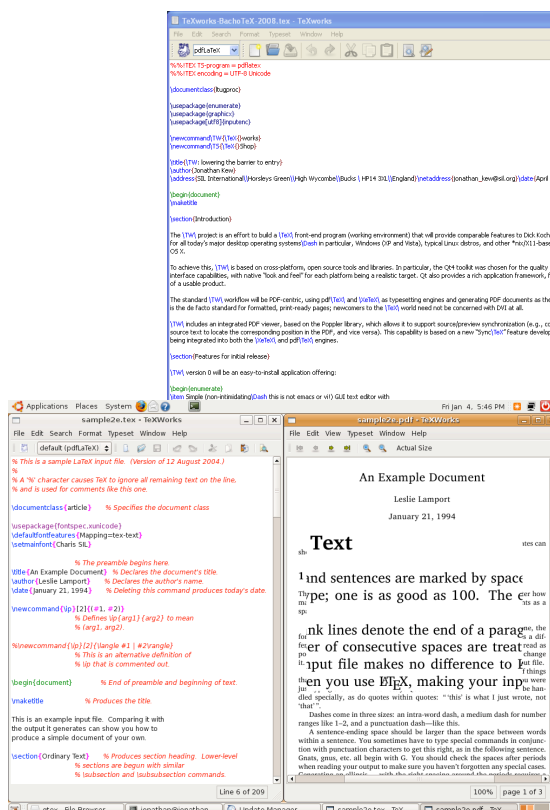
WinShell



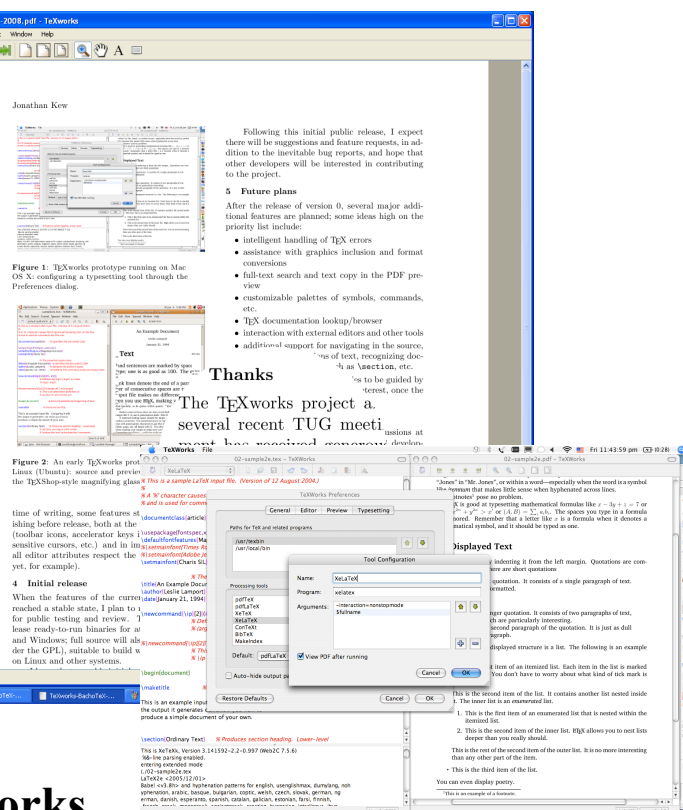
LaTeXEditor



Kile



TeXWorks



LyX: What You See Is What You Mean

5.1.6 Operators with Limits `\idx` `\sub` Operators-with-Limits

Sum \sum and integral \int operators are very often decorated with limits. These limits can be entered in LyX by entering them as you would enter a super- or subscript, directly after the symbol. The sum operator will automatically place its "limits" over and under the symbol in displayed formulas, and on the side in inline formulas. Such as $\sum_{n=0}^{\infty} \frac{1}{n!} = e$, versus

$$\sum_{n=0}^{\infty} \frac{1}{n!} = e$$

Integral signs, however, will place the limits on the side in both formula types.

All operators with limits will be automatically re-sized when placed in display mode. The placement of the limits can be changed by placing the cursor directly behind the operator and hitting M-m | or using the menu **Edit > Math > Change Limits Type**.

Certain other mathematical expressions have this "moving limits" feature as addition, such as `\idx`


$$\lim_{x \rightarrow \infty} f(x).$$

which will place the $x \rightarrow \infty$ underneath the "lim" in display mode. In inline formulas it looks like this: $\lim_{x \rightarrow \infty} f(x)$.

5.1.7 Math Symbols

Note that the section `\Ref: sub:Fu`

Figure 4.1: `\cap:Escher` M.C. Escher on acid.



This figure float show also how to set a label and create a cross-reference to it. As described in section `\Ref: sec:Cross-References`, you can simply insert a label in the caption using the menu **Insert > Label** and refer to it using the menu **Insert > Cross-Reference**. It is

Insert > Table

Font	Command
Roman	<code>\mathrm</code>
Bold	<code>\mathbf</code>
Italic	<code>\mathit</code>
Typewriter	<code>\mathtt</code>
BLACKBOARD	<code>\mathbb</code>
$\frac{1}{2}$	<code>\mathfrak</code>
<i>CALLIGRAPHIC</i>	<code>\mathcal</code>
<i>Script</i>	<code>\mathscr</code>

Resource: www.lyx.org



Entering Content



There are many excellent online tutorials and support documentation that come with the distributions

symbols-letter.pdf

tex for the impatient.pdf

Also see...

<http://www.andy-roberts.net/misc/latex/>

<http://www.tug.org/tutorials/tugindia/>

For those who venture into the style files....

<http://www.tug.org/utilities/plain/cseq.html>



AFIT's Customized Thesis Files



See AFIT LaTeX Primer for a tutorial on

- **Entering Thesis Data**
- **Adding Figures and Tables**
- **Adding Table of Contents and other front matter**
- **Using Customized Environments for AFIT theses and dissertations**
- **Sample directory of a complete typesetting project**

Also see the AFIT LaTeX Startup Kit

- **Just the bare essentials: master file; thesis style file; style files for SF 298, AFIT logo; customization files for front pages and SF 298**



Favorite Markup Commands



- **`\newcommand{\myCommand}{hello world}`**

Use only letters in the command name... no numbers, no special characters.

- **`\input{chapter5}`**

Previous AFIT latex templates use `\include` which is also an option. The commands are similar but the compilations logs for `\input` files are recorded in a master log.

Use `\include` for debugging when you want to isolate the compilation log for a specific file.



Where are the latest version of the primer and AFIT LaTeX style files?



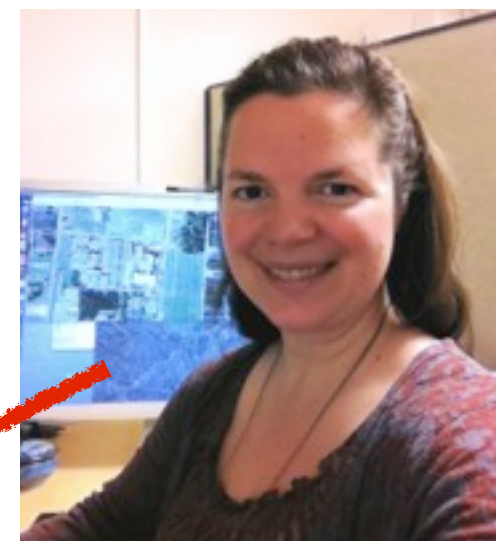
- The latest version of the AFIT LaTeX primer and the afitafitThesis style file are found on the L drive under the course PHYS files at <L:\Courses\PHYS\LaTeX>
- The current version of the AFIT style file is compliant with the latest version of the AFIT style guide.
 - Other style files exist on the L drive. Use at your own risk.
 - Older style files are not compliant with the AFIT style file nor with the current TeX distribution.
- **Note:** Historical tex files provide an excellent archive of formatting examples. Consider them fair game.

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AFIT's friendly LaTeX Guru



Dr Amy Magnus

Office: Bldg 640 Room 336D

Phone: x4555



Some LaTeX Examples

`\begin{itemize}`

`\item[(a)]` g is defined on all of $[0,1]$;

`\item[(b)]` g is non-decreasing on $[0,1]$;

`\item[(c)]` $g(0) \geq 0$;

`\item[(d)]` $g(1) \leq 1$.

`\end{itemize}`

Bibliography information is entered in a standardized environment.

```
@BOOK{apostle,  
  author = {T. M. Apostle},  
  year = 1974,  
  title = {Mathematical Analysis},  
  publisher = {Addison-Wesley Publishing Company},  
  address = {Menlo Park}  
}
```

Then, formatted according to a chosen style.

```
\backmatter
```

```
\singlespace
```

```
\bibliographystyle{thesnumb3}
```

```
\bibliography{bibliography}
```

To add bibliography information to a LaTeX document, run BibTeX and run LaTeX twice.