

Advanced Word Processing Formatting with Latex



Prerequisites:

- Athena: First Course
- Working on Athena

Instructor:

Athena[®] Training Group

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What This Course Will Cover

What Latex is and what it does

- the Latex job flow
- Basic Latex usage
- Latex-formatted files:
 - Printing
 - Previewing
- Some Latex rules
- Latex formatting options:
 - Simple options
 - Report options
- Mathematical Expressions
- Error Handling
- How to learn more

Ordinary Printed File

The Bill of Rights

The first 10 amendments to the U.S. Constitution

Proposed September 25, 1789

1st Amendment

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances

2nd Amendment

A well-regulated militia, being necessary to the security of a free state, the right of the people to keep and arm bears, shall not be infringed.

3rd Amendment

No soldier shall, in time of peace, be quartered in any house, without the consent of the owner; nor in time of war, but in a manner to be prescribed by law.

4th Amendment

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched and the persons or things to be seized.

5th Amendment

No person shall be held to answer for a capital, or otherwise infamous, crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war, or public danger; nor shall any person be subject, for the same offense, to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

Latex Output

The Bill of Rights

The first 10 amendments to the U.S. Constitution
Proposed September 25, 1789

1st Amendment *Congress shall make no law* respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the *freedom of speech*, or of *the press*; or the right of the people *peaceably to assemble*, and to petition the government for a redress of grievances.

2nd Amendment A well-regulated militia, being necessary to the security of a free state, the right of the people to keep and arm bears, shall not be infringed.

3rd Amendment No soldier shall, in time of peace, be quartered in any house, without the consent of the owner; nor in time of war, but in a manner to be prescribed by law.

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5th Amendment No person shall be held to answer for a capital, or otherwise infamous, crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war, or public danger; nor shall any person be subject, for the same offense, to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

6th Amendment In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law; and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor; and to have the assistance of counsel for his defense.

7th Amendment In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

The Job Flow

1. Edit .tex file with Emacs.

2. Save the file (**C-x C-s**).

3. Run Latex on .tex file.

```
athena% latex foo.tex
```

4. Use error messages to diagnose mistakes.

(Repeat steps 1-4 until Latex runs without errors.)

5. Preview .dvi file.

```
athena% xdvi foo.dvi&
```

(Repeat steps 1-5 until you like the result.)

6. Print the .dvi file (if needed).

```
athena% dvips -Ppython foo.dvi
```

To print only selected pages of the .dvi file, use **dvips** with the **-p** and **-l** options. Eg. to print pages 7-22 of foo.dvi:

```
dvips -p 7 -l 22 -Ppython foo.dvi
```

A Simple .tex File

```
\documentclass{doc-class}  
\begin{document}
```

This is a file named simple.tex.

It contains only the minimum commands needed to use Latex.

All Latex input files must have the .tex extension.

A .tex file always begins with a documentclass command. documentclass can be article, report, or book---where article is the simplest and most commonly used.

The only other commands that are required in a .tex file are the begin and end document commands that surround this text.

When you run a .tex file through Latex, it produces another file with a .dvi extension. You can print that file, or view it in a window on your workstation.

```
\end{document}
```

These commands begin with a backslash: \ (not /) The delimiters must be curly braces: { and }

How to run Latex

latex *filename.tex*

```
athena% ls  
eyepyr.tex          parrot.tex          simple.tex
```

```
athena% latex simple.tex  
This is TeX, Version 3.14159 (Web2C 7.3.1)  
(simple.tex  
LaTeX2e <1998/12/01> patch level 1  
Babel <v3.6x> and hyphenation patterns for american, french, german, ngerman, n  
ohyphenation, loaded.  
(/usr/athena/share/texmf/tex/latex/base/article.cls  
Document Class: article 1999/01/07 v1.4a Standard LaTeX document class  
(/usr/athena/share/texmf/tex/latex/base/size10.clo))  
No file simple.aux.  
[1] (simple.aux) )  
Output written on simple.dvi (1 page, 952 bytes).  
Transcript written on simple.log.
```

```
athena% ls  
eyepyr.tex          parrot.tex          simple.aux  
simple.dvi           simple.log          simple.tex
```

Preview

```
athena% xdvi eye-pyr.dvi&
```

This is a file named demo.tex.

It contains only the minimum commands needed to use LaTeX.

All LaTeX input files must have the .tex extension.

A .tex file always begins with a documentclass command. Documentclass can be article, report, or book—where article is the simplest and most commonly used.

The only other commands that are required in a .tex file are the begin and end document commands that surround this text.

When you run a .tex file through LaTeX, it produces another file with a .dvi extension. You can print that file, or view it in a window on your workstation.

The percentage buttons change the magnification size of the preview -- you'll need the scrollbars to see different sections of the page.

Click on any mouse button to magnify a section of the page,
For more info: click on **Help** -- will bring up info in the xterm window where xdvi was launched.

Printing a .dvi File

dvips -P*printer filename.dvi*

dvips -p *start -l end -Pprinter filename.dvi*

```
athena% dvips -Pbias demo.dvi
```

```
athena% dvips -Ppython -p 7 -l 22 foo.dvi
```

For more about the dvips command, use **man dvips**.
REMEMBER: Do NOT print a **.dvi** file using **lpr**.

Printers currently available

```
athena% cvview printers
```

```
-- Printer status as of Thu May 3 16:26:13 2001: --
```

PRINTER	CLUSTER	STATUS	JOBS	PRINTER	CLUSTER	STATUS	JOBS
barker	BARKER6	up	0	bob	M1-142	up	0
plato	M1-142	up	0	corfu	M2-032	up	0
celine	M2-225	up	0	medea	M4-035	up	0
pandora	M4-035	up	0	color-4-035	M4-035	up	0
sanda	M4-167	up	0	bias	M12-182	up	6
savion	M12-182	up	0	hayden	HAYDEN	up	0
acantha	M33-202	up	0	electra	M37-324	up	0
varan	M37-324	up	0	peecs	M38-370	up	0
helios	M56-129	up	3	homer	M66-080	up	8
pindar	M66-080	up	1	picus	E51-075	up	0
pietro	ROTCH	up	15	ajax	W20-575	up	0
ceres	W20-575	up	0	python	W20-575	up	0
fiber	W20-575	up	0	pulp	W20-575	up	0

```
athena%
```

The printer thesis, in the MIT Copytech Center (in 11-004), is for final copy of your thesis only (archival bond paper).

You can also get a map of the clusters, with info about available printers in each from Dash:

Help -> Help on Athena -> *Athena Cluster Map

Default Formatting

- Ignores line breaks and extra spaces in the source file
- Makes appropriate line and page breaks, hyphenating words if necessary
- Justifies the text in each paragraph (adjusts the spacing to line up the text against both margins)
- Leaves no blank line between paragraphs
- Indents each paragraph, except the first paragraph of a section or subsection
- Produces large, book-size margins
- Sets text in a 10 point font, single-spaced

Text Rules and Spaces

- Words: Use a single space to separate words. (Extra spaces are ignored.)

tex file:

```
All           extra           spaces  
are           ignored
```

output:

All extra spaces are ignored.

- Paragraphs: Leave a blank line to start a new paragraph. (Otherwise paragraphs will all be run together.)
- End of a sentence: indicated by a . ? or ! followed by a space.

Inter-word vs. End-of-sentence

\<space> -- makes an explicit inter-word space.
Usually used after a period that is not the end of a sentence:

.tex file:

```
Mean Mr. Mustard sleeps in the park.  
Mean Mr.\ Mustard sleeps in the park.
```

output:

```
Mean Mr. Mustard sleeps in the park.  
Mean Mr. Mustard sleeps in the park.
```

Note: Latex deals with spaces after periods in an interesting way, but usually gets things right. Check the Latex manual for more info, or if you're having trouble.

An Ounce of Prevention

~
`\mbox{word}`

To format lines neatly, Latex decides where to break lines:

- between words
- within a long word (with a hyphen)

To prevent a line-break between words:

```
see Figure~7  
from~1~to~10  
Miss~Jane~Pittman
```

To prevent hyphenation:

The function `\mbox{XmCreateBulletinBoard}` is used to...

Is the idea behind `\mbox{http://www.paintthemoon.org/}` really possible?

Special Characters

To get these:

\$ % & _ { }

Type these:

\# \\$ \% \& _ \{ \}

These are trickier: ~ ^ \

~ tilde

- for Unix (~foo.tex) or math ('similar to'): \sim
- over a foreign character: \tilde{n}

^ circumflex (or 'hat')

- for math: \hat{o}
- over a foreign character: \hat{o}

\ backslash

- use: \backslash

Note: Loads of special characters are available -- check sections 3.2 and 3.3 of the Latex manual.

Quotation Marks

Don't use the usual double-quote marks in a .tex file. Use two back-quote marks ‘ ‘ to begin a quote, and two apostrophes ’ ’ to end.

.tex file:

```
``Dost thou thinke because thou art vertuous, there  
shall be no more Cakes and Ale?''
```

result:

“Dost thou thinke because thou art vertuous, there shall be no
more Cakes and Ale?”

Note: Emacs has a special Latex-mode. In it, when you type quotes you'll automatically get either `` or '' -- whichever it thinks is needed. If Emacs guesses wrong, you can explicitly type whichever kind you wanted.

Dashes

Produce dashes of three different sizes by typing one, two, or three dashes in a .tex file:

- an intra-word dash or hyphen, ex:

`x-ray`

- a medium dash for number ranges, ex:

`1--5`

- a punctuation dash, ex:

```the IRS---fiend or foe?''`

`x-ray`

`1-5`

`"the IRS—fiend or foe?"`

---

Note: Don't put any space before or after a dash.

# Changing the Defaults

**`\documentclass`**  
**`\usepackage`**

Default:

```
\documentclass{doc-class}
```

Modified:

```
\documentclass[doc-options]{doc-class}
\usepackage[package-options]{packages}
```

- *doc-class* -- (*required*) defines overall type of document: article, book, report, letter, or MITThesis
- *doc-options* -- (*optional*) options that modify features of specific doc-class
- *package* -- (*required if “\usepackage” is used*) additional features that can be used with any doc-class
- *package-options*: (*optional*) modifications to package

Example:

```
\documentclass[12pt,leqno]{article}
\usepackage{fullpage}
```

---

You can specify multiple doc-options, packages, and package-options. Separate them with commas, without spaces.

# Changing Overall Type Size

**[11pt]**

**[12pt]**

The default type size is 10 point. These change the overall type size to 11 point or 12 point. Use in the first line of the file.

```
\documentclass[12pt]{article}
```

This is 10 point: Millenium Fever... Catch it!

This is 11 point: Millenium Fever... Catch it!

This is 12 point: Millenium Fever... Catch it!

---

We will discuss changing the size of individual words or phrases later in this course.

## **Other Options**

Some other article documentclass options:

- `twocolumn` -- Prints pages in two-column format
- `titlepage` -- Generates separate titlepage
- `leqno` -- Prints numbers for equations on left side of page
- `fleqn` -- Aligns displayed formulas on left side of page
- `landscape` -- Produces pages in landscape orientation
- `twoside` -- Puts a wider margin on the “bound” side of pages that will be reproduced as double-sided for binding. (Doesn’t print double-sided.)

---

To find out more about these and other options, look at on-line help and the Latex manual.

# Changing Line-spacing

Single-spacing is default for the documentclass **article**.

To double-space the entire document:

```
\usepackage{doublespace}
```

If you want to single-space a section of a double-spaced document, use:

```
\begin{singlespace}
text to be singlespaced goes here
within the singlespace environment.
\end{singlespace}
```

---

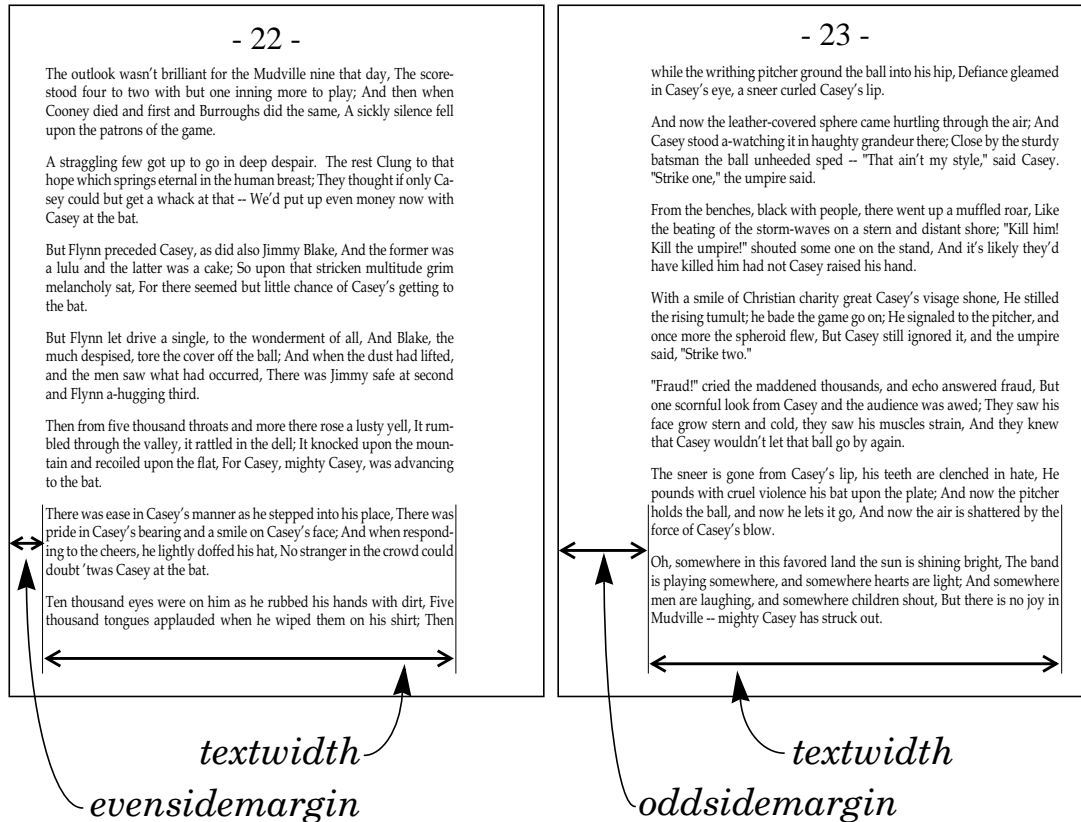
The doublespace option will not affect footnotes, figures, and tables; they will remain single-spaced.

# Changing the Margins

Default margins are very wide, eg. 1.875 inches for a document in 10pt.  
For more typical one-inch margins all around:

```
\usepackage {fullpage}
```

For Other Margin Sizes:



To produce one-inch margins left and right:

```
\documentclass{article}
\addtolength{\oddsidemargin}{-.875in}
\addtolength{\evensidemargin}{-.875in}
\addtolength{\textwidth}{1.75in}
\begin{document}
```

Latex keeps track of Odd- and Even-numbered pages because it's useful for double-sided documents.

You can also change the top and bottom margins and the headers and footers-- check the Latex manual for more information.

# Changing Type Styles

`{\bf text}`

or:

`\begin{bf}`  
*text*  
`\end{bf}`

```
Bruno Kabloona! {\bf Bruno Kabloona!}\\
Brave, courageous, and {\bf bold!}\\
\begin{bf}
Long live his fame,\\
And long live his glory,\\
\end{bf}
And long may his story be told!
```

Bruno Kabloona! **Bruno Kabloona!**  
Brave, courageous, and **bold!**  
**Long live his fame,**  
**And long live his glory,**  
And long may his story be told!

---

bf = bold-face

\\ = new line

# More Styles

```
{\tt This is typewriter font-style.}
{\sf This is sans serif font-style.}
{\sc This is Small Caps font-style.}
{\sl This is slanted font-style.}
{\it This is italic font-style.}
{\em This is emphasized font-style.}
```

This is typewriter font-style.  
 This is sans serif font-style.  
 THIS IS SMALL CAPS FONT-STYLE.  
*This is slanted font-style.*  
*This is italic font-style.*  
*This is emphasized font-style.*

```
\begin{em}
Emphasized type looks like italic, but the ``em'' command can be nested, if you
want to\/{\em add more emphasis\/} to something already within an emphasized
environment. Latex uses\/{\em roman type\/} to indicate the additional
emphasis.
\end{em}
```

*Emphasized type looks like italic, but the “em” command can be nested, if  
 you want to add more emphasis to something already within an emphasized  
 environment. Latex uses roman type to indicate the additional emphasis.*

---

Notice the use of the **V** command. It puts enough space between any leaning type and the non-leaning type that follows -- to prevent crashing.



## To Boldly Go Italic

Latex cannot make bold and italic by nesting **bf** and **it**.  
Instead:

1) Load the font:

```
\documentclass{article}
\newfont{\boldit}{cmbxti10}
```

2) Put the selected text into the new environment

Just some regular text, for comparison.

Some ordinary emphasized text.

```
\begin{boldit}
Is this important enough text for such emphasis?
\end{boldit}

{\boldit Why does this text merit the special fancy
font?}
```

Just some regular text, for comparison.

*Some ordinary emphasized text.*

***Is this important enough text for such emphasis?***

***Why does this text merit the special fancy font?***

## Changing Type Sizes

.tex file:

`\tiny` Moose and Squirrel?  
`\scriptsize` Moose and Squirrel?  
`\footnotesize` Moose and Squirrel?  
`\small` Moose and Squirrel?  
`\normalsize` Moose and Squirrel?  
`\large` Moose and Squirrel?  
`\Large` Moose and Squirrel?  
`\LARGE` Moose and Squirrel?  
`\huge` Moose and Squirrel?  
`\Huge` Moose and Squirrel?

result:

Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
Moose and Squirrel?  
**Moose and Squirrel?**  
**Moose and Squirrel?**

Note: UPPER vs. lower case makes a difference: (large Large LARGE). You can also get other type sizes-- look at the olc stock-answers for information.

# **Title Page -- result**

## Latex Notes

Aard and Jonah Varck

July 23, 2004

This is a file named demo-1.tex.

It contains a few more than the minimum commands needed to use L<sup>A</sup>T<sub>E</sub>X.

A .tex file always begins with a documentclass command.

documentclass can be article, report, or book – where article is the simplest and most commonly used.

The only other commands that are required in a .tex file are the begin and end document commands that surround this text.

The maketitle command generates the title page. The other new commands specify the contents of the title page. (For an article, the title page includes the start of the article text.)

When you run a .tex file through L<sup>A</sup>T<sub>E</sub>X, it produces another file with a .dvi extension. You can print that file, or view it in a window on your workstation.

# The Title Page

```
\documentclass{article}
\title{Latex Notes}
\author{Aard and Jonah Varck}
\date{January 1, 2001}
% If no \date command is included, Latex will use today's date.

\begin{document}
\maketitle
```

This is a file named demo-1.tex.

It contains a few more than the minimum commands needed to use \LaTeX.

A .tex file always begins with a documentclass command.

documentclass can be article, report, or book -- where article is the simplest and most commonly used.

The only other commands that are required in a .tex file are the begin and end document commands that surround this text.

The maketitle command generates the title page. The other new commands specify the contents of the title page. (For an article, the title page includes the start of the article text.)

When you run a .tex file through \LaTeX, it produces another file with a .dvi extension. You can print that file, or view it in a window on your workstation.

```
\end{document}
```

---

Everything between the **\documentclass** and **\begin{document}** commands is called the “preamble”.

If you want to generate a separate title page, use the “titlepage” option or the report documentclass; check the olc stock-answers for details.

# Divisions -- result

## 3 Bad News from the South

In southern Florida, they're starting to report a new kind of cockroach. It's big -- about the size of your thumb -- and it has wings, and it's attracted to light. It's a pretty scary bug.

Besides being larger than any non-mammalian vermin ought to be, those wings mean that it can, and does, hover in front of people's faces, making the occasional flying jump at their ears and mouths. You don't want to close your eyes when you yawn.

### 3.1 The Light

That "attracted-to-light" stuff, though, that's the worst. I used to live in a roachy apartment in Brooklyn, New York, but no matter how bad the bugs got, I could always count on one thing: they hated the light.

### 3.2 Into the Dark

At night, before I stepped into my dark kitchen, I'd close my eyes, hit the lights, and count to five, *slowly*. When I opened my eyes, the kitchen looked okay, and I could get what I wanted.

Sure, it was a little creepy, knowing there were these *things*, in the dark corners, watching me, ready to jump out as soon as the light went off. But that was kind of like being six years old again, and afraid of the lobster-monsters lurking under my bed or in the laundry hamper.

#### 3.2.1 Stealthy, but Familiar

I guess that feeling had never really gone away; it was familiar to me. So having stealthy, sneaky cockroaches around didn't bother me much. These new roaches, now, they scare the bejesus out of me.

**Too Scary** I don't usually say things like "*scare the bejesus out of me*," but these bugs, like I said, are coming up from Florida, and down there people do say, "*scare the bejesus out of me*." And when they describe these giant roaches, they say it a lot.

**Something to Imagine** Imagine going into your kitchen at night.

**That Little Light** It's quiet, and it's dark. You go to the refrigerator. You open it. The little light inside comes on.

**An Exclamation of Horror** And ninety-dozen buzzing, thumb-sized cockroaches come flying out of the cool night air, and into your refrigerator to cozy up to that little light. Eeaagghhh!

# Divisions -- .tex file

`\section{Bad News from the South}`

In southern Florida, they're starting to report a new kind of cockroach. It's big -- about the size of your thumb -- and it has wings, and it's attracted to light. It's a pretty scary bug.

Besides being larger than any non-mammalian vermin ought to be, those wings mean that it can, and does, hover in front of people's faces, making the occasional flying jump at their ears and mouths. You don't want to close your eyes when you yawn.

`\subsection{The Light}`

That ``attracted-to-light'' stuff, though, that's the worst. I used to live in a roachy apartment in Brooklyn, New York, but no matter how bad the bugs got, I could always count on one thing: they hated the light.

`\subsection{Into the Dark}`

At night, before I stepped into my dark kitchen, I'd close my eyes, hit the lights, and count to five, `{\em slowly}`. When I opened my eyes, the kitchen looked okay, and I could get what I wanted.

Sure, it was a little creepy, knowing there were these `{\em things}`, in the dark corners, watching me, ready to jump out as soon as the light went off. But that was kind of like being six years old again, and afraid of the lobster-monsters lurking under my bed or in the laundry hamper.

`\subsubsection{Stealthy, but Familiar}`

I guess that feeling had never really gone away; it was familiar to me. So having stealthy, sneaky cockroaches around didn't bother me much. These new roaches, now, they scare the bejesus out of me.

`\paragraph{Too Scary}`

I don't usually say things like `{\em ``scare the bejesus out of me,''} but these bugs, like I said, are coming up from Florida, and down there people do say, {\em ``scare the bejesus out of me.''} And when they describe these giant roaches, they say it a lot.`

`\paragraph{Something to Imagine}`

Imagine going into your kitchen at night.

`\subparagraph{That Little Light}`

It's quiet, and it's dark. You go to the refrigerator. You open it. The little light inside comes on.

`\subparagraph{An Exclamation of Horror}`

And ninety-dozen buzzing, thumb-sized cockroaches come flying out of the cool night air, and into your refrigerator to cozy up to that little light. Eeaagghhh!

## Footnotes

**\footnote**{*body of footnote*}

Among Chef Maurice's better recipes for road-prepared small game\footnote{Usually known as ``road-kill.''} is one called ``Potted Squirrel {\em au improv}.''

Among Chef Maurice's better recipes for road-prepared small game<sup>1</sup> is one called “Potted Squirrel *au improv*.”

---

1. Usually known as “road kill.”

# Centering

```
\begin{center}
```

```
The KREL Anthem
```

```
\end{center}
```

The KREL campaign was one of the highlights of the decade. The introduction of KREL in 1981 changed buying patterns everywhere, and shocked advertisers with its unorthodox marketing techniques. Here is the KREL theme, as originally published:

```
\begin{center}
```

```
When the sun comes up on America,\\
```

```
And the workin' day's begun,\\
```

```
American folks at American jobs\\
```

```
Make this country run.\\
```

From the highways to the mountains,  
Where the mighty rivers flow,  
Across the land, the building hands  
Are making America grow.

```
We're here and we know why --
Because we do the things we do.
(And we know we do them well!)
In a world that turns to America,\\[.25 in]
America turns to {\bf KREL!}
\end{center}
```

## The KREL Anthem

The KREL campaign was one of the highlights of the decade. The introduction of KREL in 1981 changed buying patterns everywhere, and shocked advertisers with its unorthodox marketing techniques. Here is the KREL theme, as originally published:

When the sun comes up on America,  
And the workin' day's begun,  
American folks at American jobs  
Make this country run.

From the highways to the mountains, Where the mighty rivers flow, Across the land,  
the building hands Are making America grow.

We're here and we know why -- Because we do the things we do. (And we know we do  
them well!) In a world that turns to America,

America turns to **KREL!**



## Quotations -- result

Sir Toby's first remarks are no querulous whining, but an indignant bacchanalian bellow:

What a plague means my niece to take the death of her brother thus? I am sure care's an enemy to life. (*I.iii.1*)

He is Pleasure's impassioned advocate. There is, even in his cozening of Sir Andrew, at least as much desire to win that melancholy soul for Revelry as to lighten his poorly-guarded purse.

Wherefore are these things hid? Wherefore have these gifts a curtain before 'em? Are they like to take dust, like Mistress Mall's picture?

Why dost thou not go to church in a galliard and come home in a coranto? My very walk should be a jig. I would not so much as make water but in a sink-a-pace. What dost thou mean? Is it a world to hide virtues in?

I did think, by the excellent constitution of thy leg, it was formed under the star of a galliard. (*I.iii.121*)

## Quotations -- .tex file

**quote** -- for short quotations

**quotation** -- for long quotations

Sir Toby's first remarks are no querulous whining, but an indignant bacchanalian bellow:

```
\begin{quote}
```

What a plague means my niece to take the death of her brother thus? I am sure care's an enemy to life.

```
{\em(I.iii.1)}
```

```
\end{quote}
```

He is Pleasure's impassioned advocate. There is, even in his cozening of Sir Andrew, at least as much desire to win that melancholy soul for Revelry as to lighten his poorly-guarded purse.

```
\begin{quotation}
```

Wherefore are these things hid? Wherefore have these gifts a curtain before 'em? Are they like to take dust, like Mistress Mall's picture?

Why dost thou not go to church in a galliard and come home in a coranto? My very walk should be a jig. I would not so much as make water but in a sink-a-pace. What dost thou mean? Is it a world to hide virtues in?

I did think, by the excellent constitution of thy leg, it was formed under the star of a galliard.

```
{\em (I.iii.121)}
```

```
\end{quotation}
```

## **Lists: Enumerate -- Result**

### **From the “Dead Parrot Sketch”**

1. It's not pining, it's passed on.

2. This parrot is no more.

It has ceased to be.

It's expired and gone to meet its maker.

3. This is a late parrot.

4. It's a stiff.

5. Bereft of life, it rests in peace. If you hadn't nailed it to the perch, it would be pushing up the daisies. It's rung down the curtain and joined the choir invisible.

6. This is an ex-parrot!

## Lists: Enumerate -- .tex file

```
\documentclass{article}
\begin{document}
{\bf From the ``Dead Parrot Sketch''}
\begin{enumerate}

\item It's not pining, it's passed on.

\item This parrot is no more.

It has ceased to be.

It's expired and gone to meet its maker.

\item This is a late parrot.

\item It's a stiff.

\item Bereft of life, it rests in peace. If you hadn't
nailed it to the perch, it would be pushing up the
daisies. It's rung down the curtain and joined the choir
invisible.

\item This is an ex-parrot!

\end{enumerate}
\end{document}
```

---

Note: You can nest lists until the cows come home.<sup>1</sup>

---

1.  $T_{\text{CCH}} = \text{Sunset} \pm 12 \text{ minutes EDT}$ , between  $23^{\circ}56'23''\text{N}$  and  $66^{\circ}32'56''\text{N}$ , April-November, only.

## Lists: Itemize

### **.tex file:**

```
{\bf From the ``Dead Parrot Sketch''}
\begin{itemize}
\item It's not pining, it's passed on!
.
.
.
\item This is an ex-parrot!
\end{itemize}
```

### **result:**

#### **From the “Dead Parrot Sketch”**

- It's not pining, it's passed on.
- This parrot is no more.  
It has ceased to be.  
It's expired and gone to meet its maker.
- This is a late parrot.
- It's a stiff.
- Bereft of life, it rests in peace. If you hadn't nailed it to the perch, it would be pushing up the daisies. It's rung down the curtain and joined the choir invisible.
- This is an ex-parrot.

# Lists: description -- Result

## THELONIOUS MONK - THE COMPOSER

**'Round Midnight** Thelonious Monk, piano (Hollywood, CA; November 19, 1968 -- from: Greatest Hits)

**Bemsha Swing** Thelonious Monk, piano; Charlie Rouse, tenor sax; Butch Warren, bass; Frankie Dunlop, drums (Tokyo, Japan; May 21, 1963 -- from: Tokyo Concerts)

**Rhythm-a-ning** Thelonious Monk, piano; Charlie Rouse, tenor sax; John Ore, bass; Frankie Dunlop, drums (New York City; November 6, 1962 -- from: Criss Cross)

**Reflections** Thelonious Monk, piano; Charlie Rouse, tenor sax (Hollywood, CA; November 19, 1962 -- from: Monk's Blues)

**Straight, No Chaser** Same as "Bemsha Swing"

**Brilliant Corners** Same as "Reflections"

**Ruby, My Dear** Thelonious Monk, piano (New York City; March 2, 1965 -- from: Greatest Hits)

**Well You Needn't** Thelonious Monk, piano; Charlie Rouse, tenor sax; Larry Gales, bass; Ben Riley, drums (Los Angeles, CA; October 31, 1964 -- from: Live at the It Club)

**Blue Monk** Thelonious Monk, piano; Charlie Rouse, tenor sax (Hollywood, CA; November 19, 1968 -- previously unreleased)

**Criss Cross** Thelonious Monk, piano; Charlie Rouse, tenor sax; John Ore, bass; Frankie Dunlop, drums (New York City; February 26, 1963 -- from: Criss Cross)

**Crepescul with Nellie** Thelonious Monk, piano; Charlie Rouse, tenor sax; John Ore, bass; Frankie Dunlop, drums (New York City; March 29, 1963 -- from: Criss Cross)

# Lists: description -- .tex file

```
% This is how to put a comment in a .tex file.
% Notice the use of brackets [] vs. curly-braces {}
{\bf THELONIOUS MONK - THE COMPOSER}

\begin{description}

\item ['Round Midnight] Thelonious Monk, piano (Hollywood, CA; November 19,
1968 -- from: Greatest Hits)

\item [Bemsha Swing] Thelonious Monk, piano; Charlie Rouse, tenor sax; Butch
Warren, bass; Frankie Dunlop, drums (Tokyo, Japan; May 21, 1963 -- from: Tokyo
Concerts)

\item [Rhythm-a-ning] Thelonious Monk, piano; Charlie Rouse, tenor sax; John
Ore, bass; Frankie Dunlop, drums (New York City; November 6, 1962 -- from:
Criss Cross)

\item [Reflections] Thelonious Monk, piano; Charlie Rouse, tenor sax
(Hollywood, CA; November 19, 1962 -- from: Monk's Blues)

\item [Straight, No Chaser] Same as ``Bemsha Swing''

\item [Brilliant Corners] Same as ``Reflections''

\item [Ruby, My Dear] Thelonious Monk, piano (New York City; March 2, 1965 --
from: Greatest Hits)

\item [Well You Needn't] Thelonious Monk, piano; Charlie Rouse, tenor sax;
Larry Gales, bass; Ben Riley, drums (Los Angeles, CA; October 31, 1964 -- from:
Live at the It Club)

\item [Blue Monk] Thelonious Monk, piano; Charlie Rouse, tenor sax (Hollywood,
CA; November 19, 1968 -- previously unreleased)

\item [Criss Cross] Thelonious Monk, piano; Charlie Rouse, tenor sax; John Ore,
bass; Frankie Dunlop, drums (New York City; February 26, 1963 -- from: Criss
Cross)

\item [Crepescale with Nellie] Thelonious Monk, piano; Charlie Rouse, tenor
sax; John Ore, bass; Frankie Dunlop, drums (New York City; March 29, 1963 --
from Criss Cross)

\end{description}
```

---

*Thelonious Monk - The Composer* -- Columbia Jazz Masterpieces, © 1988 CBS Records, Inc.

# Mathematical Expressions

- Simple expressions in “running text”:

**`$expression$`**

Ex:

Let `$a$` and `$b$` be two relatively prime integers, where `$b > a$`

Let  $a$  and  $b$  be two relatively prime integers, where  $b > a$

- “Displayed” expressions:

**`\begin{displaymath}`**  
*expression*  
**`\end{displaymath}`**

or either of these abbreviations:

**`\(expression\)`**

or

**`$$expression$$`**

Ex:

A displayed expression stands out from the text around it -- it's on a separate line, not part of the running text. For example: `\[x = y^{\{2\}} - z^{\{2\}}\]` is a displayed expression.

A displayed expression stands out from the text around it -- it's on a separate line, not part of the running text. For example:

$$x = y^2 - z^2$$

is a displayed expression.



# More Math

## Superscripts and Subscripts

$^{\{value\}}$   
 $_{\{value\}}$

$\$a_{\{i\}} = a_{\{i-1\}} + b^{\{n\}} \$$

$$a_i = a_{i-1} + b^n$$

---

Latex's ability to handle mathematical expressions is one of its most popular features!

# Further Math

Fractions:

- /

`$22/7$` is a fair approximation of `$\pi$`

*22/7* is a fair approximation of  $\pi$

- `\frac{num}{denom}`

`\[b=p\frac{1+d}{d}\]`

$$b = p \frac{1+d}{d}$$

---

Greek letters and lots of special characters are available in Latex.  
See the manual -- chapter 3!

# Yet Further Math

## Roots

`\sqrt{value}`

Ex:

`\[\sqrt{\frac{3x}{2}}\]`

$$\sqrt{\frac{3x}{2}}$$

All of these (and more) can be combined:

`\[\sum_{i=1}^n x_i =`  
`\int_0^1`  
`\frac`  
`\{g\sin\{\theta\}\}`  
`\{d\theta\}\]`

$$\sum_{i=1}^n x_i = \int_0^1 \frac{g \sin \theta}{d\theta}$$

---

Did we mention that chapter 3 of the Latex manual has lots more information about mathematical expressions?

# Numbered Equations

If you want your displayed mathematical expressions to be numbered, use the `\em equation` environment instead:

```
\begin{equation}
L_{\mathrm{v}} = L_{\mathrm{r}} \sqrt{1 - \frac{v^2}{c^2}}
\end{equation}
\begin{equation}
M_{\mathrm{v}} = M_{\mathrm{r}} \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}
\end{equation}
```

Result:

If you want your displayed mathematical expressions to be numbered, use the *equation* environment instead:

$$L_v = L_r \sqrt{1 - \frac{v^2}{c^2}} \quad (1)$$

$$M_v = M_r \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (2)$$

---

You can use the **leqno** and **fleqn** options to alter the positions of your equations. For more information, check the Latex manual.

# Error Messages

```
athena% latex parrot.tex
```

```
This is TeX, Version 3.14159 (Web2C 7.3.1)
(parrot.tex
LaTeX2e <1998/12/01> patch level 1
Babel <v3.6x> and hyphenation patterns for american, french, german, ngerman, n
ohyphenation, loaded.
(/usr/athena/share/texmf/tex/latex/base/article.cls
Document Class: article 1999/01/07 v1.4a Standard LaTeX document class
(/usr/athena/share/texmf/tex/latex/base/size10.clo)) (parrot.aux)
```

```
! LaTeX Error: Environment quotatoin undefined.
```

```
See the LaTeX manual or LaTeX Companion for explanation.
```

```
Type H <return> for immediate help.
```

```
...
```

```
1.17 \begin{quotatoin} ←—————
```

```
? ?
```

```
Type <return> to proceed, S to scroll future error messages,
```

```
R to run without stopping, Q to run quietly,
```

```
I to insert something, E to edit your file,
```

```
1 or ... or 9 to ignore the next 1 to 9 tokens of input,
```

```
H for help, X to quit.
```

```
? H
```

```
Your command was ignored.
```

```
Type I <command> <return> to replace it with another command,
```

```
or <return> to continue without it.
```

```
? x
```

```
No pages of output.
```

```
Transcript written on parrot.log.
```

```
athena%
```

# Finding the Error

```
\documentclass{article}
\title{From the ``Dead Parrot Sketch''}
\author{Monty Python's Flying Circus}
\date{\today}
\addtolength{\oddsidemargin}{-.875in}
\addtolength{\evensidemargin}{-.875in}
\addtolength{\textwidth}{1.75in}
\begin{document}
\maketitle

\section{From the ``Dead Parrot Sketch''}

Astonished at being told that his stiff, dead parrot is merely ``pining
for the fjords,'' the infuriated customer's response is deliberate and
to the point:

\begin{quotation} ←—————
It's not pining, it's passed on!
This parrot is no more.
It has ceased to be.
It's expired and gone to meet its maker.
This is a late parrot.
It's a stiff.
Bereft of life, it rests in peace!
If you hadn't nailed it to the perch, it would be pushing up the
daisies.
It's rung down the curtain and joined the choir invisible.

{\em This} is an ex-parrot!

\end{quotation}

\end{document}
```

---

You can find much more information about errors and error-recovery in the Latex manual -- section 2.3 and chapter 6.

## Common Latex Errers

- misspelled command or environment name, e.g. `\begin{itemie}`
- improperly matching braces (easy to do!)
- trying to use one of the special characters, e.g. `$` or `#` as an ordinary printing symbol
- unmatched delimiters, e. g. `\[` without `\]`
- use in ordinary text of a command like `^(superscript)` that can appear only in a mathematical formula
- a missing `\end` command
- missing command argument, e.g. `\frac{25}`

## The Job Flow (Review)

1. Edit .tex file with Emacs.

2. Save the file (**C-x C-s**).

3. Run Latex on .tex file.

```
athena% latex foo.tex
```

4. Use error messages to diagnose mistakes.

(Repeat steps 1-4 until Latex runs without errors.)

5. Preview .dvi file.

```
athena% xdvi foo.dvi&
```

(Repeat steps 1-5 until you like the result.)

6. Print the .dvi file (if needed).

```
athena% dvips -Ppython foo.dvi
```

---

To print only selected pages of the .dvi file, use **dvips** with the **-p** and **-l** options. Eg. to print pages 7-22 of foo.dvi:

```
dvips -p 7 -l 22 -Ppython foo.dvi
```



## **Other Stuff to Try**

- nested lists
- different fonts
- different fontsizes
- postscript pictures included in a document
- sourcecode included in a document
- tables, figures, arrays
- automatic bibliographies
- cross-referencing

---

You can learn how to do all of these things by looking at olc stock-answers, on-line help, as well as checking in the Latex Users Manual.

## To Learn More

**On-Line Help** -- Athena's own on-line documentation has menus and 'modules' for most Athena topics. Those related to this course include:

<http://web.mit.edu/olh/Latex/>  
athena% **help latex**

**Printed Documentation** -- Sold at the Tech Copy Centers, in the basements of Bldg 11 and W20, including:

*Essential Latex on Athena*  
*More Latex on Athena -- Reports and Advanced Topics*  
*More Latex -- MIT Thesis*  
*Inessential Latex (available from SIPB, free!)*

**Manuals** -- Commercially-produced system and software manuals, at Barker and Hayden libraries, for sale at The Coop. Recommended:

*The Latex Users Manual*, by L. Lamport (famous, with blue cover)  
*The Tex Book*, by D. Knuth

**'man' pages** -- manual pages about commands, programs, files, and other system info.

athena% **man dvips**

**Minicourses** -- Courses on Athena usage are taught often throughout the year.

<http://web.mit.edu/minidev>

## If You Need Help

- **olc** is Athena's on-line consulting service  
athena% **olc**
- **Consulting Hotline:** x3-4435, for answers to software and system questions
- **Hardware Hotline** (x3-1410) or <hotline@mit.edu>, for help with hardware-based problems and to report broken equipment

---

Note: the olc stock answers include an extensive section on Latex -- check it out.

# **This Page...**

left intentionally mostly-blank.

## Minicourse Questionnaire (cont'd)

Please fill out this side of the page AFTER taking the minicourse.

(please circle one in each row)

5. How was the instructor's pace?	Too SLOW	1	3	5	3	1	Too FAST
6. How difficult was the course material?	Too EASY	1	3	5	3	1	Too HARD

7. How well did you understand the instructor?	POORLY	1	2	3	4	5	PERFECTLY
8. How well did the instructor answer questions?	POORLY	1	2	3	4	5	PERFECTLY

9. Did you have any questions you didn't ask?

If yes, why not? \_\_\_\_\_

10. Was any topic not covered that you had expected to learn in this course?

If so, what topic? \_\_\_\_\_

11. Why did you take this course? (check one)

☐ General Interest

☐ Required for a course. (Which? \_\_\_\_\_ )

☐ To be able to do something. (What? \_\_\_\_\_ )

12. Besides Athena, how much computer experience do you have?

(None) 1 2 3 4 5 (Lots)

13. How often have you used Athena in the past? (check one)

☐ never

☐ several times a week

☐ a few times

☐ daily

☐ once a week

14. How would you estimate your knowledge of the subject of this course...

...Before taking it? (None) 1 2 3 4 5 (Lots)

...After taking it? (None) 1 2 3 4 5 (Lots)

15. Additional comments:

