\documentclass{article}
\begin{document}
\title{An Example}
\author{Mark Senn}
\maketitle
This is the first paragraph.

This is the second paragraph.
\end{document}
Unix/Linux Commands for Example

latex example  read example.tex and write example.dvi
xdvi example  preview example.dvi
dvips example  print example.dvi
Unix/Linux Commands for More Complicated Document

texspell name         spell check name.tex
latex name            read name.tex, make of list things \cite'd
bibtex name           make bibliography*
latex name            replace \cite commands with proper citations*
latex name            fix any cross-references that need changing
xdvi name             preview name.dvi
dvips name             print name.dvi

*only needed if using BibTeX
Getting More Information/Books

*The \TeXbook* by Donald Knuth. ISBN 0-201-13447-0.


Getting More Information/Web Pages

**\LaTeX** by Norm Walsh:  
http://www.ora.com/homepages/jasper/texhelp/LaTeX.html

**\LaTeX** help from Emory University:  
http://www.emerson.emory.edu/services/latex/latex2e/latex2e_toc.html.

Document Preparation with **\LaTeX**, from University of Sterling, UK:  

Introduction to **\LaTeX**:  
http://www.cec.mtu.edu/all/node18.html.

A Guide to **\LaTeX** from the University of Alberta:  

Hypertext Help with **\LaTeX**:  
http://molscat.giss.nasa.gov/LaTeX.
\LaTeX\ is a computer program that reads your file containing commands and text for something you want typeset. It normally reads your file whose name ends in ‘.tex’ and writes a file whose name ends with ‘.dvi’.

The ‘.dvi’ file is device-independent meaning that it can be typeset on a very wide range of output devices. Some of the more common ones are: cheap dot matrix printers, computer screens, laser printers, and expensive phototypesetters.

\LaTeX\ is not a “What You See is What you Get’ (WYSIWYG) program. Documents are created in an ordinary editor and then processed by \LaTeX\ to generate a file that can later be printed.
Prof. Donald Knuth of Stanford University’s Computer Science Department wrote \TeX to publish his seven-volume series of books, *The Art of Computer Programming*. He wasn’t happy with other computer typesetting systems in the early ’80s. \TeX input files specify what the output should look like.

Dr. Leslie Lamport of the Systems Research Center at Digital Equipment Corporation wrote \LaTeX while employed at SRI International. \LaTeX is based on \TeX. \LaTeX input files specify the logical structure of a document and \LaTeX takes care, to a large extent, of what the document should look like.
\LaTeX{} is being rewritten by Frank Mittelbach, Chris Rowley, and Rainer Schöpf. This endeavor is called the \LaTeX{}3 Project.

The basic goal of the \LaTeX{}3 Project is just to improve on \LaTeX{} 2ε with no major changes apparent to the normal user. Writing and modifying document classes is easier in \LaTeX{}3.
\LaTeX{} 2.09 was the first version of \LaTeX{} widely used. It used ‘\documentstyle’ instead of ‘\documentclass’.

The current version of \LaTeX{} is \LaTeX{} 2ε, also known as \LaTeX{} 2e since that’s easier to say and write. Besides using the new ‘\documentclass’ command it also has a compatibility mode to process documents that use \LaTeX{} 2.09’s ‘\documentstyle’.

Now, when most people say \LaTeX{} they mean \LaTeX{} 2ε, also known as \LaTeX{} 2e.

Use the ‘\documentclass’ command for all new documents.
There are two basic types of \LaTeX\ commands:

- **Control Sequences** (usually known simply as commands)
  
  \texttt{\textbackslash command[options]\{parameter1\}\{parameter2\}…}
LaTeX Commands

There are two basic types of \LaTeX\ commands:

- Control Sequences (usually known simply as commands)
  \[ \text{\textbackslash command}[\text{options}]\{\text{parameter1}\}\{\text{parameter2}\}\ldots \]

- Environments
  \[ \text{\textbackslash begin}\{\text{environment}\} \]
  \[ \vdots \]
  \[ \text{\textbackslash end}\{\text{environment}\} \]
There are two basic types of \texttt{\LaTeX} commands:

\begin{itemize}
\item Control Sequences (usually known simply as commands)
  \begin{verbatim}
  \texttt{command[options]}\{open curly brace parameter\}
  \{parameter\} \ldots
  \end{verbatim}
\item Environments
  \begin{verbatim}
  \texttt{\begin{environment}}
  \texttt{:}
  \texttt{\end{environment}}
  \end{verbatim}
\end{itemize}

Curly braces can be used to limit the scope of a command:
\begin{verbatim}
{\texttt{command}} \ldots
\end{verbatim}
General LaTeX Input File Format

\documentclass[options]{documentclass}

\begin{document}

\textit{preamble (definitions, etc.)}

\begin{document}

\textit{body (what to typeset)}

\end{document}
\LaTeX{} comes with the following document classes:

- book
\LaTeX{} comes with the following document classes:

- book
- report
\LaTeX{} comes with the following document classes:

- \texttt{book}
- \texttt{report}
- \texttt{article}
\LaTeX\ comes with the following document classes:

- book
- report
- article
- letter
\LaTeX{} comes with the following document classes:

- book
- report
- article
- letter

The \texttt{thesis} document class is for Purdue theses.
\LaTeX\ comes with the following document classes:

- book
- report
- article
- letter

The \textit{thesis} document class is for Purdue theses.

Other document classes are available.
Paragraphs are separated by blank lines.
Input Reading Rules

Paragraphs are separated by blank lines.
Spaces at the beginning of a line are ignored.
Input Reading Rules

Paragraphs are separated by blank lines.
Spaces at the beginning of a line are ignored.
A newline (Enter key) is equivalent to a space.
Input Reading Rules

Paragraphs are separated by blank lines.
Spaces at the beginning of a line are ignored.
A newline (Enter key) is equivalent to a space.
Multiple spaces are the same as one space.
Input Reading Rules

Paragraphs are separated by blank lines.
Spaces at the beginning of a line are ignored.
A newline (Enter key) is equivalent to a space.
Multiple spaces are the same as one space.
A % starts a comment.
The % and everything after it on that line are ignored.
Keep all lines 78 characters or less.
Keep all lines 78 characters or less.

Put “outermost” (not in quotes, parentheses, etc.) comma, semicolon, colon, period, and right parenthesis at end of line.
Text Input Suggestions

Keep all lines 78 characters or less.

Put “outermost” (not in quotes, parentheses, etc.) comma, semicolon, colon, period, and right parenthesis at end of line.

Start every sentence on a new line.
Keep all lines 78 characters or less.

Put “outermost” (not in quotes, parentheses, etc.) comma, semicolon, colon, period, and right parenthesis at end of line.

Start every sentence on a new line.

Put ‘and’ at the beginning of a line.
Text Input Suggestions

Keep all lines 78 characters or less.

Put “outermost” (not in quotes, parentheses, etc.) comma, semicolon, colon, period, and right parenthesis at end of line.

Start every sentence on a new line.

Put ‘and’ at the beginning of a line.

Indent two spaces when inside an environment.
Text Input Suggestions

Keep all lines 78 characters or less.

Put “outermost” (not in quotes, parentheses, etc.) comma, semicolon, colon, period, and right parenthesis at end of line.

Start every sentence on a new line.

Put ‘and’ at the beginning of a line.

Indent two spaces when inside an environment.

Indent comments two spaces.
This is an example. From The Holy Bible, King James Version, Gen. 1.3:
\begin{quotation}
And God said, let there be light:
and there was light.
\end{quotation}

And God said, let there be light: and there was light.
Display Math Input Suggestions

Keep all lines 78 characters or less.
Display Math Input Suggestions

Keep all lines 78 characters or less.

Start every equation on a new line.
Display Math Input Suggestions

Keep all lines 78 characters or less.

Start every equation on a new line.

Indent continuation lines two spaces.
Display Math Input Suggestions

Keep all lines 78 characters or less.
Start every equation on a new line.
Indent continuation lines two spaces.
Indent two spaces when inside an environment.
Display Math Input Suggestions

Keep all lines 78 characters or less.
Start every equation on a new line.
Indent continuation lines two spaces.
Indent two spaces when inside an environment.
Indent comments two spaces.
% A trigonometric equation
% with some extra nonsense
% to demonstrate continuation lines.
\begin{equation}
\alpha + \beta + \gamma
- \alpha - \beta - \gamma
+ (\sin x)^2 + (\cos x)^2 = 1
\end{equation}

\alpha + \beta + \gamma - \alpha - \beta - \gamma + (\sin x)^2 + (\cos x)^2 = 1 \quad (1)
The following characters have special meaning:

\$
The following characters have special meaning:

- \$  
- \%

Special Characters
The following characters have special meaning:

- $  
- %  
- &

To get them printed normally put a ‘\’ (backslash, also known as virgule) before them.

**Example:**  \$  gives  $
Control Sequences

\cs[options]{parameter1}{parameter2}…

This is a control sequence (command) named ‘cs’ followed by optional \textit{options} followed by, in some cases, a list of parameters.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>\dag</td>
<td>†</td>
<td>dagger</td>
</tr>
<tr>
<td>\[1in]</td>
<td></td>
<td>end current line and vertically skip one inch</td>
</tr>
<tr>
<td>\vspace{2in}</td>
<td></td>
<td>vertically skip two inches</td>
</tr>
<tr>
<td>$\sqrt{x}$$</td>
<td>$\sqrt{x}$</td>
<td>the $’s$ are for math mode</td>
</tr>
<tr>
<td>$\sqrt[3]{x}$</td>
<td>$\sqrt[3]{x}$</td>
<td>the $’s$ are for math mode</td>
</tr>
<tr>
<td>$\frac{a}{b}$</td>
<td>$\frac{a}{b}$</td>
<td>the $’s$ are for math mode; the braces aren’$t$ really necessary</td>
</tr>
</tbody>
</table>

"Beginning \LaTeX\” Short Course
Curly Braces Limit Scope

\{cs \ldots\}

The ‘{’ and ‘}’ limit the scope of \textit{cs} to inside the braces.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I {\textbf{am} } here</td>
<td>\textit{I am here}</td>
<td>\textbf{bf} is bold face</td>
</tr>
<tr>
<td>I {\textsc{Large am} } here</td>
<td>\textbf{I am} here</td>
<td>\textsc{Large} is large</td>
</tr>
</tbody>
</table>
\begin{env}

This begins and ends the environment \textit{env}.

\end{env}

**INPUT**

This is a sentence.
\begin{quotation}
This is an example quotation.
\end{quotation}

**OUTPUT**

This is a sentence.

This is an example quotation.
\title{title}
\author{author’s name}

Use ‘\and’ to separate multiple authors.
Example: ‘Joe Jones\and Sam Smith’.
Example: ‘Joe Jones\and Sam Smith\and Mark Senn’.

\date{date}

‘\date’ is optional. If not specified, today’s date will be used.

\maketitle
\part{part name}
Sectioning Commands

\part{part name}

\chapter{chapter name}
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
\subsubsection{subsubsection name}
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
\subsubsection{subsubsection name}
\paragraph{paragraph name}
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
\subsubsection{subsubsection name}
\paragraph{paragraph name}
\subparagraph{subparagraph name}
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
\subsubsection{subsubsection name}
\paragraph{paragraph name}
\subparagraph{subparagraph name}

Not all sectioning commands are available in all document classes.
Sectioning Commands

\part{part name}
\chapter{chapter name}
\section{section name}
\subsection{subsection name}
\subsubsection{subsubsection name}
\paragraph{paragraph name}
\subparagraph{subparagraph name}

Not all sectioning commands are available in all document classes.

**Example:** \section{Intro} gives Intro
Normally, \LaTeX{} figures out where to stop one page and go the next. This is called breaking the page.
Normally, \LaTeX{} figures out where to stop one page and go the next. This is called breaking the page.

Use `\newpage` to fill rest of page with blank space and go to next page.
Page Control

Normally, $\LaTeX$ figures out where to stop one page and go the next. This is called breaking the page.

Use \texttt{\textbackslash newpage} to fill rest of page with blank space and go to next page.

Use \texttt{\textbackslash pagebreak} to break the column here. For one column output this is the same as using \texttt{\textbackslash newpage}.
Normally, \LaTeX\ figures out where to stop one page and go the next. This is called breaking the page.

Use `\newpage` to fill rest of page with blank space and go to next page.

Use `\pagebreak` to break the column here. For one column output this is the same as using `\newpage`.

Use `\nopagebreak` to forbid a column page break here.
Normally, \texttt{\LaTeX} figures out where to stop one page and go the next. This is called breaking the page.

Use `\newpage` to fill rest of page with blank space and go to next page.

Use `\pagebreak` to break the column here. For one column output this is the same as using `\newpage`.

Use `\nopagebreak` to forbid a column page break here.

Use `\clearpage` to break the page here and print any pending tables or figures.
Left Justify, Center, Right Justify Text

\begin{flushleft}
  Left justify.
\end{flushleft}

\begin{center}
  Center. \\
  Second line.
\end{center}

\begin{flushright}
  Right justify. \\
  Second line. \\
  Third line.
\end{flushright}
Normally, \LaTeX figures out when to stop one line and go the next. Use \texttt{\textbackslash newline} or \texttt{\textbackslash \textbackslash} to fill rest of line with blank space and go to next line. I use \texttt{\textbackslash \textbackslash} because it is easier to type. Use \texttt{\textbackslash linebreak} to break a line here. Use \texttt{\textbackslash nolinebreak} to forbid a line break here.
\LaTeX{} has four kinds of dashes.

The hyphen is used for hyphenated words.

The en-dash is used to separate two parts of a range like in 1–10. It is also used in contexts like ‘exercise 1.2.6–52’.

The em-dash is used for punctuation in sentences—they are what we often call simply dashes.

The minus sign is used in math formulas.

To get a hyphen type ‘–’ (one hyphen).

**Example:** a 32-bit computer GIVES a 32-bit computer
En-dashes are used for number ranges like ‘pages 13–34’ and also in contexts like ‘exercise 1.2.6–52’.

To get an en-dash type ‘--’ (two hyphens).

**Example:** pages 1--5 in **GIVES** pages 1–5 in
Em-dashes are used for punctuation in sentences—they are what we often call dashes.

To get an em-dash type ‘---’ (three hyphens).

**Example:** in sentences---they GIVES in sentences—they
The minus sign is available only in math mode.

To get a minus sign type, ‘–’ (one hyphen) while in math mode.

**Example:** \[ a = b - c \] GIVES \[ a = b - c \]
Quotes

To get a single left quote (‘) type the left quote key (‘) once.
To get a single right quote (’) type the right quote key (’) once.
Quotes

To get a single left quote (‘) type the left quote key (‘) once.
To get a single right quote (’) type the right quote key (’) once.

To get double left quotes (“) type the left quote key (‘) twice.
To get double right quotes (”) type the right quote key (’) twice.
Quotes

To get a single left quote (‘) type the left quote key (‘) once.
To get a single right quote (’) type the right quote key (’) once.
To get double left quotes (“) type the left quote key (‘) twice.
To get double right quotes (”) type the right quote key (’) twice.
Do not use the double quote key (“) on the keyboard.

Example: in ‘single’ quotes GIVES in ‘single’ quotes
Example: in ‘‘double’’ quotes GIVES in “double” quotes
Lowercase Letter Doesn’t End Sentence

Normally a lowercase letter, period, whitespace sequence ends a sentence.
Lowercase Letter Doesn’t End Sentence

Normally a lowercase letter, period, whitespace sequence ends a sentence.

We need a way to indicate when this sequence isn’t the end of a sentence.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr._Smith</td>
<td>Dr. Smith</td>
<td>wrong, ‘Dr.’ ends sentence</td>
</tr>
<tr>
<td>Dr. _Smith</td>
<td>Dr. Smith</td>
<td>wrong, ‘Dr.’ and ‘Smith’</td>
</tr>
<tr>
<td>Dr.~Smith</td>
<td>Dr. Smith</td>
<td>right, ‘Dr.’ tied to ‘Smith’</td>
</tr>
</tbody>
</table>

"Beginning \LaTeX" Short Course
**Uppercase Letter Does End Sentence**

Normally an uppercase letter, period, whitespace sequence does not end a sentence. (\LaTeX{} guesses it is a person’s initial even if there are multiple uppercase letters in a row. It only looks at the character immediately before the period.)

We need a way to indicate when this sequence is the end of a sentence.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know C. Yes.</td>
<td>I know C. Yes.</td>
<td>wrong</td>
</tr>
<tr>
<td>I know C@. Yes.</td>
<td>I know C. Yes.</td>
<td>right</td>
</tr>
<tr>
<td>I’m at IBM. Yes.</td>
<td>I’m at IBM. Yes.</td>
<td>wrong</td>
</tr>
<tr>
<td>I’m at IBM@. Yes.</td>
<td>I’m at IBM. Yes.</td>
<td>right</td>
</tr>
</tbody>
</table>
\tiny Sample
\scriptsize Sample
\footnotesize Sample
\small Sample
\normalsize Sample
\large Sample
\Large Sample
\LARGE Sample
\huge Sample
\Huge Sample

EXAMPLE: \{a \{\tiny faint\} voice\} GIVES \{a faint voice\}
Font Styles, Font Sizes, Italic Correction

\textbf{Bold Face}
\textit{Italics}
\texttt{Roman}
\textsc{Small Caps}
\textsf{Sans-serif}
\textsl{Slanted}
\texttt{Typewriter}

**Example:** a \textit{big} deal \textbf{GIVES} a big deal
Italic Correction, Font Styles

When switching from italic or slanted font to an upright font one should add the italic correction, except when a small punctuation character follows.

This is to compensate for the slant of the italic or slanted character so the next character is not too close.

Type ‘\’ to get the italic correction.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{strained} beet</td>
<td>strained beet</td>
<td>wrong</td>
</tr>
<tr>
<td>\textit{strained}/ beet</td>
<td>strained beet</td>
<td>right</td>
</tr>
<tr>
<td>strained \textit{beet}.</td>
<td>strained beet</td>
<td>right</td>
</tr>
<tr>
<td>strained \textit{beet/}.</td>
<td>strained beet</td>
<td>wrong</td>
</tr>
</tbody>
</table>
Combination Font Changes

Font changes can be nested.

**Input**

\begin{verbatim}
normal
{\it italics}\\
{\large large {\it italics} large}\\
normal
\end{verbatim}

**Output**

\begin{verbatim}
normal italics large italics large normal
\end{verbatim}
The ‘enumerate’ and ‘itemize’ environments are used to make lists of items. Enumerate numbers the items and itemize puts bullets in front of items.

See a \LaTeX{} book for a description of the more advanced ‘description’ environment that lets you specify how you’d like each item labelled.
Enumerate Environment

The `enumerate` environment numbers items.

I suggest indenting as shown here so it is easy to see where items begin and end.

**Input**

```
\begin{enumerate}
  \item This is the first item.
  \item This is the second item.
\end{enumerate}
```

**Output**

1. This is the first item.
2. This is the second item.
The `itemize` environment puts a `\bullet` before each item.

**Input**

```
\begin{itemize}
\item The input for this first item
    is over one line.
    Input lines after the first are indented.
\item This is the second item.
\end{itemize}
```

**Output**

- This input for this first item is over one line. Input lines after the first are indented.
- This is the second item.
Mathematics is typeset two different ways.
Mathematics is typeset two different ways.

Text math is typeset in text like this: \( a = b + c \).
Mathematics is typeset two different ways.

Text math is typeset in text like this: $a = b + c$.

Displayed math is typeset on a line by itself with extra vertical space before and after it like this:

$$a = b + c$$
Text Mathematics

To do text mathematics put ‘\(’ or ‘$’ before the math and ‘\)’ or ‘$’ after the math. I use ‘$’ before and after because it is easier to type.

\(\text{\LaTeX}\) ignores all spaces in text and display math mode.

So, ‘$a = b + c$’, would be typeset exactly like ‘$a=b+c$’.

**Example:** $a = b - c$ GIVES $a = b - c$
Display Mathematics

To do display math put ‘\[' before the math and ‘\]' after the math. I suggest indenting display math input by two spaces so it is easy to see where the display math begins and ends.

**Input**

\[
\begin{align*}
  a &= b + c \\
  a + b &= c
\end{align*}
\]

**Output**

\[a + b = c\]
The ‘equation’ environment is used for numbered equations. I suggest indenting display math input by two spaces so it is easy to see where the display math begins and ends.

**Input**

\begin{equation}
\sum_{1}^{n} = \frac{n(n+1)}{2}
\end{equation}

**Output**

\[ \sum_{1}^{n} = \frac{n(n+1)}{2} \quad (2) \]
Subscripts and superscripts are only available in math mode.
Subscripts and Superscripts

Subscripts and superscripts are only available in math mode.

To make a subscript precede it with ‘_’ (underline).
To make a superscript precede it with ‘^’ (up arrow).

The examples are mostly shown using subscripts, superscripts work in a similar way.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>a_b</td>
<td>$a_b$</td>
<td></td>
</tr>
<tr>
<td>a_bc</td>
<td>$a_b c$</td>
<td></td>
</tr>
<tr>
<td>a_{bc}</td>
<td>$a_{bc}$</td>
<td>use braces for grouping</td>
</tr>
<tr>
<td>a_{b_c}</td>
<td>$a_{bc}$</td>
<td>$a_b c$ won’t work, use braces for grouping</td>
</tr>
<tr>
<td>a_b^{c^{d}}</td>
<td>$a_b^{c^{d}}$</td>
<td>mixed subscripts and superscripts</td>
</tr>
</tbody>
</table>
The \texttt{\textbackslash label} control sequence lets you give a chapter, section, equation, etc., a name for use with \texttt{\textbackslash ref}.

You can \texttt{\textbackslash ref} the name you used in \texttt{\textbackslash label} to insert the corresponding chapter, section, equation, etc. number.

\textbf{Example:}
\begin{verbatim}
\begin{equation}
\texttt{\textbackslash label{eq:einstein}}
E = mc^2
\end{equation}
\end{verbatim}

\begin{verbatim}
\begin{equation}
E = mc^2 \tag{3}
\end{equation}
\end{verbatim}

In equation \texttt{\textbackslash ref{eq:einstein}} the relationship between $E = mc^2$ (3)