

# **L<sup>A</sup>T<sub>E</sub>X Document Structure**

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# Elements of a Good Article

1. Title
2. Author(s)
3. Date
4. Abstract
5. Table of Contents
6. Section and Subsection Heads
7. References
8. Footnotes
9. Miscellaneous environments

## Declaring a Document's Class

Recall the basic structure of a  $\text{\LaTeX}$  document.

```
\documentclass{article}
```

(This area is called the preamble.)

```
\begin{document}
```

(Type the body of your document here.)

```
\end{document}
```

The command `\documentclass{article}` instructs  $\text{\LaTeX}$  to use the `article` class when structuring your document. Some other  $\text{\LaTeX}$  document classes are:

**report** Good for writing a report, thesis, etc.

**book** Used for writing books.

**letter** Used for crafting letters, memos, etc.

**slides** Used for creating slides for overhead transparencies.

# Creating the Title of an Article

Use WinEdt to create the following source code. Lines beginning with % are comments and are ignored by the  $\text{\LaTeX}$  compiler.

```
\documentclass{article}

%Always place the following commands in the preamble
\title{My First \LaTeX\ Article}
\author{David Arnold}
\date{March 12, 1999}

\begin{document}

%But create the title in the body of the document
\maketitle

Place the body of your article here.

\end{document}
```

Save the file as `work1.tex` in any directory outside the `\texmf` tree. Click the Set Main File button in WinEdt,  $\text{\LaTeX}$  the file, then preview the resulting DVI file (`work1.dvi`).

# Creating a Separate Title Page

To create a separate title page, use the `titlepage` option in the class declaration.

```
\documentclass[titlepage]{article}

%Always place the following commands in the preamble
\title{My First \LaTeX\ Article}
\author{David Arnold}
\date{March 12, 1999}

\begin{document}

%But create the title in the body of the document
\maketitle

Place the body of your article here.

\end{document}
```

Save the file,  $\LaTeX$ , then preview the result. Note that there are now **two** pages to preview.

# Creating an Abstract

Remove the separate titlepage from your article and create an abstract by adjusting the source in `work1.tex` as follows:

```
\documentclass{article}
\title{My First \LaTeX\ Article}
\author{David Arnold}
\date{March 12, 1999}
\begin{document}
\maketitle
```

```
%The abstract goes here
```

```
\begin{abstract}
```

An abstract is one of the most important parts of your article. Readers use the abstract to determine if they want to read further, so you have to hook them in with a good abstract.

```
\end{abstract}
```

Place the body of your article here.

```
\end{document}
```

Save,  $\LaTeX$ , and preview.

## Adding Some Body

Add some body to your document by adjusting your source as follows.

```
\documentclass{article}
\title{My First \LaTeX\ Article}
\author{David Arnold}
\date{March 12, 1999}
\begin{document}
\maketitle
\begin{abstract}
An abstract is one of the most important parts of
your article. Readers use the abstract to determine
if they want to read further, so you have to hook
them in with a good abstract.
\end{abstract}
```

This time we want to place something significant in the body of our document. After you are done, use copy and paste to follow this paragraph with about 50 copies of itself. Remember to separate paragraphs in the source with at least one blank line.

```
\end{document}
```

Save,  $\LaTeX$ , and preview.

## Sections and Subsections

Use `\section` to get automatically numbered section headings.

```
\section{Type Whatever You Want Here}
```

This time we want to place something significant in the body of our document. After you are done, use copy and paste to follow this paragraph with about 50 copies of itself. Remember to separate paragraphs in the source with at least one blank line.

Subsections are entered with the `\subsection` command.

```
\subsection{Type Whatever You Want Here}
```

This time we want to place something significant in the body of our document.

Sprinkle the body of your document with `\section` and `\subsection` commands,  $\LaTeX$ , and preview.

Use `\section*` and `\subsection*` to get unnumbered sections and subsections. For example,

```
\section*{Type Whatever You Want Here}
```

# Table of Contents

Add a table of contents (TOC) to your document by placing the `\tableofcontents` command right after your abstract. You need to  $\LaTeX$  your document at least twice before previewing.

```
\documentclass{article}
\title{My First \LaTeX\ Article}
\author{David Arnold}
\date{March 12, 1999}
\begin{document}
\maketitle
\begin{abstract}
An abstract is one of the most important parts of
your article. Readers use the abstract to determine
if they want to read further, so you have to hook
them in with a good abstract.
\end{abstract}

\tableofcontents

\end{document}
```

Note that the starred forms of section and subsection commands do not show up in the TOC.

## Secnumdepth and Tocdepth

Remove all of the starred forms of `\section` and `\subsection` from your source. Add some subsubsections with

```
\subsubsection{Type Whatever You Want}
```

The `secnumdepth` counter controls which headers get numbered. To number first level headers only (`\section` headers), place the command `\setcounter{secnumdepth}{1}` in the preamble. To effect these changes in the TOC, you need to  $\LaTeX$  twice before previewing.

The command `\setcounter{secnumdepth}{2}` would number the first two header levels (`\section` and `\subsection`).

In a similar manner, placing `\setcounter{tocdepth}{1}` in the preamble will only allow level one headers (`\section`) in the TOC.

# The Bibliography

The bibliography is created with the environment

```
\begin{thebibliography}{sample.label}
entries
\end{thebibliography}
```

The individual entries in the bibliography each begin with the command

```
\bibitem[label]{key} entry.text
```

The `label` is optional, the `key` is not. For example, append the following to end of your source, just before the `\end{document}` command.

```
\begin{thebibliography}{99}
\bibitem{arnold} Arnold, \emph{Intermediate Algebra}
\end{thebibliography}
```

Note that no `label` is provided, so bibliography items will be numbered automatically, beginning with the number 1. Bibitems are indented after the first line by a width equal to that of `sample.label`, so this should be as large as the longest label in the bibliography.  $\LaTeX$  and preview.

# Referencing the Bibliography

The citation in the body of the document is made with the command

```
\cite{key}
```

For example, to reference Arnold's *Intermediate Algebra* enter the command `\cite{arnold}` in the body of your document,  $\LaTeX$ , and preview.

If you don't want automatic numbering, you can use the optional `label` of the `\bibitem` command to create your own labels. For example, edit your source as follows,  $\LaTeX$ , and preview.

```
\begin{thebibliography}{Arnold, 1993}
\bibitem[Arnold, 1993]{arnold} Arnold,
    \emph{Intermediate Algebra}
\end{thebibliography}
```

# Footnotes

$\LaTeX$  provides automatically numbered footnotes. Enter the following in your source,  $\LaTeX$ , and preview.<sup>1</sup>

```
\TeX\footnote{Pronounced ‘‘tech.’’} typesetting  
is fun!
```

Always place a footnote immediately after the word it references. If the footnote references a sentence or phrase, place it after the punctuation mark. Enter the following into your source,  $\LaTeX$ , and preview.

```
In the first place,\footnote{What happens to second  
place?} I don't want to hear about it!
```

---

<sup>1</sup>Note the quotes. The leading quotes are produced by striking the left single apostrophe, located to the left of the 1 key on your keyboard. The trailing quotes are produced by striking the right single apostrophe, located below the double quotes on your keyboard.

## Enumerated Lists

A numbered list in  $\text{\LaTeX}$  is called an *enumerated list*. Enter the following into your source,  $\text{\LaTeX}$ , and preview.

```
\begin{enumerate}
\item Put on the paper.
\item Put on the tape.
\item Put on the ribbon.
\end{enumerate}
```

Enumerated lists can be nested (up to four levels). Enter the following into your source,  $\text{\LaTeX}$ , and preview.

```
\begin{enumerate}
\item If  $f(x)=x^2-2x-3$ , then  $f(2)$  equals
  \begin{enumerate}
\item  $-3$ 
\item  $2$ 
\item  $-9$ 
\item  $12$ 
\item None of these
  \end{enumerate}
\item What is the formula for the area of a circle?
\end{enumerate}
```

## Bulleted Lists

Bulleted lists are similar to enumerated lists. Enter the following into your source,  $\text{\LaTeX}$ , and preview.

```
\begin{itemize}
\item Put on the paper.
\item Put on the tape.
\item Put on the ribbon.
\end{itemize}
```

Bulleted lists can be nested (up to four levels). Enter the following into your source,  $\text{\LaTeX}$ , and preview.

```
\begin{itemize}
\item The graph of  $x=\cos^3 t$ ,  $y=\sin^3 t$  is
symmetric with respect to
  \begin{itemize}
    \item the  $x$ -axis,
    \item the  $y$ -axis, and
    \item the origin.
  \end{itemize}
\item Parametric equations are fun!
\end{itemize}
```

## Descriptive Lists

$\LaTeX$  uses the `description` environment to create glossary-like lists. Enter the following into your source,  $\LaTeX$ , and preview.

```
\begin{description}
```

```
\item[elephant] A large mammal with a long snout and  
ivory tusks, usually found in Africa.
```

```
\item[skunk] A foul smelling animal, all black with  
a white stripe down its back and tail, usually  
encountered by Don Hicketier on his morning ride  
to work.
```

```
\item[golf swing] Something Todd is working on!  
\end{description}
```

# Tables

$\text{\LaTeX}$ 's tabular environment is used to create tables. Enter the following into your source,  $\text{\LaTeX}$ , and preview.

```
\begin{tabular}{ll}
\textbf{Name} & \textbf{Address} \\
David Arnold & 1223 My Blue Heaven \\
Mike Butler & 666 Devil's Highway \\
Todd Olsen & 1234 Sand Trap \\
\end{tabular}
```

The `&` is used to separate entries in a row. The `\\` signals the end of a row. You can right justify the address column with

```
\begin{tabular}{lr}
\textbf{Name} & \textbf{Address} \\
David Arnold & 1223 My Blue Heaven \\
Mike Butler & 666 Devil's Highway \\
Todd Olsen & 1234 Sand Trap \\
\end{tabular}
```

You can center each column and place a horizontal line under the first row with

```
\begin{tabular}{cc}
\textbf{Name} & \textbf{Address} \\ \hline
David Arnold & 1223 My Blue Heaven \\
Mike Butler & 666 Devil's Highway \\
Todd Olsen & 1234 Sand Trap \\
\end{tabular}
```

You can separate columns with vertical lines and rows with horizontal lines.

```
\begin{tabular}{|c|c|} \hline
\textbf{Name} & \textbf{Address} \\ \hline
David Arnold & 1223 My Blue Heaven \\ \hline
Mike Butler & 666 Devil's Highway \\ \hline
Todd Olsen & 1234 Sand Trap \\ \hline
\end{tabular}
```

You can center your entire table by inserting it in a centering environment.

```
\begin{center}
Code for table goes here.
\end{center}
```

## Using the Tabular Environment

Here's a nice application of the tabular environment.

```
\begin{enumerate}
```

```
\item If  $x^3-2x^2-3x-11$  is divided by  $x+1$ , the  
remainder is\\
```

```
\begin{tabular}{llllll}
```

```
a)  $x-3$  &
```

```
b)  $x+1$  &
```

```
c)  $x-11$  &
```

```
d)  $x-2$  &
```

```
e) None of these\\
```

```
\end{tabular}
```

```
\item What is the formula for the area of a circle?\\
```

```
\begin{tabular}{llllll}
```

```
a)  $\pi r^2$  &
```

```
b)  $2\pi r$  &
```

```
c)  $\pi d^2$  &
```

```
d)  $2\pi d$  &
```

```
e) None of these\\
```

```
\end{tabular}
```

```
\end{enumerate}
```

# Quotes and Quotations

Use the quote environment for small quotes.

```
\begin{quote}
```

```
Now is the time for all good men to come to the aid  
of their country. Now is the time for all good men  
to come to the aid of their country.
```

```
\end{quote}
```

Use the quotation environment for longer quotes.

```
\begin{quotation}
```

```
Now is the time for all good men to come to the aid  
of their country. Now is the time for all good men  
to come to the aid of their country.
```

```
Now is the time for all good men to come to the aid  
of their country. Now is the time for all good men  
to come to the aid of their country.
```

```
\end{quotation}
```

## The Verbatim Environment

If you want L<sup>A</sup>T<sub>E</sub>X to respect spacing and linebreaks, use the `verbatim` environment. This is especially useful for pasting computer code into your document.

```
\begin{verbatim}

while (i <= m) & (j <= n)
  [p,k] = max(abs(A(i:m,j))); k = k+i-1;
  if (p <= tol)
    A(i:m,j) = zeros(m-i+1,1);
    j = j + 1;
  else
    jb = [jb j];
    A([i k],j:n) = A([k i],j:n);
    A(i,j:n) = A(i,j:n)/A(i,j);
    for k = [1:i-1 i+1:m]
      A(k,j:n) = A(k,j:n) - A(k,j)*A(i,j:n);
    end
    i = i + 1;
    j = j + 1;
  end
end

\end{verbatim}
```