

A L^AT_EX Primer / Template

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Abstract

This is how you make an abstract. The text inside this command will be centered, indented and of a smaller size than the article as a whole. The text will also have a small header that says “Abstract” above it.

1 Sections, Subsections and Commands

While an article is not required to be broken into sections and subsections, one of the benefits of doing so is that they will be listed automatically on the table of contents, should you include one at the beginning of your paper. Sections will be numbered if the normal `\section{}` command is used; the `\section*{}` command does not produce any numbering. A similar system applies to `\subsection{}`.

1.1 Using subsections

There can be as many of these as you want. They don't need to have text, but it looks fairly silly if they don't. Sections and subsections are automatically given some space between them; we will discuss how to manually direct text spacing in the next section.

1.2 A note on command notation

As you may have noticed, commands in L^AT_EX begin with a `\`. Also, many characters such as `%` and `$` have special meaning and are used to invoke different symbols or environments within L^AT_EX. As such, there are special commands to invoke them as text characters rather than commands. Some examples are used in this section; as you may have noticed, both the backslash character and braces are special characters since they are used in commands. It can get tiresome switching in and out of math mode and using the `\backslash` command — and it's easy to forget if one is in math mode if the ESS environment isn't active.

For the remainder of this primer, commands will not be referred to using a backslash or braces; see examples in the text or Google the command for the specific syntax of a given command.

As a general rule, if a character doesn't turn out the way you expect or causes an error at runtime, try putting a `\` in front of it and/or surrounding it with `$` marks in order to put it into math mode. We'll discuss math mode a little later on, but consider this example:

Even a child knows that $1 \nmid 2$.

Even a child knows that $1 < 2$.

2 Spacing Issues

There are a few basic commands for text spacing in \LaTeX . An example of a page break was commented on earlier. For less dramatic spacing, the `smallskip`, `medskip` and `bigskip` commands are used. They have no brace options.

Text lines that occur after one another are considered to be in the same paragraph. If you put a space between them but no spacing command (as is the case here) a new paragraph will form immediately after the other with no space between the two.

You can call one of these commands twice or mix-and-match to get different amounts of spacing. All of these commands are special versions of `vspace`, which takes in a brace option which gives the amount of space:

Be sure to include the units. Similarly, you can force horizontal spacing in a line of text by using `hspace`. Usually, indenting and the like is better accomplished using `quote` or `center` environments, but `hspace` has its uses. A special version of `hspace` is `hfill`, which takes up as much space as is available, giving equal weight to all `hfill` commands in a given line. For example:

Goes on the left			Goes on the right
Far Left	X	X	Far Right

3 Lists, Fonts and Font Sizes

- Use the `textbf` command to get **bold** text.
- Use the `emph` command to get *italic* text.
- Use both to get ***bold italic*** text.
- These changes are visible while coding in an ESS environment.

These are examples of itemized lists, which are created when the `itemize` environment is invoked with the `begin` command. Note that this environment will remain active until terminated with the `end` command.

There are two other list environments, `enumerate` and `description`. The former looks similar to and has the same syntax as `itemize` except that the items are numbered. The `description` environment requires a `title` option for each item, which is presented in bold at the beginning of the line:

Your is a possessive that indicates ownership

You're is a contraction of “you are”

Idiots refers to those who don't know the difference

The above example was not meant to be insulting to anyone, especially the idiots. Note that while new paragraphs are usually indented, you can force a paragraph to have no indent using the `noindent` command.

List environments can be mixed-and-matched inside one another in order to create nested lists:

- There are ten font sizes
- You will need to reset the font size manually (see below)
- Font size also affects enumeration and bulleting
- Here are the font sizes in increasing order:
 1. tiny
 2. scriptsize
 3. footnotesize
 4. small
 5. normalsize
 6. large
 7. Large
 8. LARGE
 9. huge
 10. Huge

4 Useful Environments (Modes)

4.1 Center mode

The center environment forces all text to be centered. Text will fill the width of the page before starting a new line, unless the `\\` command is used to force a new line:

Stuck in the
middle with you

4.2 Math mode

The math environment (often referred to as math mode) is used for mathematical or statistical symbols, Greek letters, fractions and some special characters. It can be invoked using the `begin` command, but a nifty shorthand is the `$` operator, which turns math mode on/off. Normal text within math mode will be slightly smaller and in italics; You may have noticed this in Section 1. Math mode has a LOT of special characters, not all of which have intuitive names. A quick Google search will provide math mode reference manuals. To give you a taste, here is a excerpt from one of my projects:

Assume that for any given element, each lichen species has a Normal (Gaussian) distribution with an unknown mean and variance, neither of which need be the same for the two species:

$$F \sim N(\mu_F, \sigma_F^2) \quad \text{and} \quad P \sim N(\mu_P, \sigma_P^2)$$

At each site, we assume that the mean for each species is shifted by some unknown site-specific but otherwise constant amount, but that the variances are unchanged. Thus at site j the distributions F_j and P_j at that site are distributed

$$F_j \sim N(\mu_F + \lambda_j, \sigma_F^2) \quad \text{and} \quad P_j \sim N(\mu_P + \lambda_j, \sigma_P^2)$$

The correction factor is $\Delta = \mu_F - \mu_P$; under these assumptions,

$$\bar{F}_j - \bar{P}_j \sim N\left(\Delta, \frac{\sigma_F^2}{N_{F_j}} + \frac{\sigma_P^2}{N_{P_j}}\right)$$

where N_{F_j} and N_{P_j} are the number of *F. caperata* and *P. rudecta* samples at site j , respectively. Thus a rough 99% confidence interval for Δ at site j is given by

$$\left([\bar{F}_j - \bar{P}_j] - 2.5 \times \sqrt{\frac{\sigma_F^2}{N_{F_j}} + \frac{\sigma_P^2}{N_{P_j}}}, [\bar{F}_j - \bar{P}_j] + 2.5 \times \sqrt{\frac{\sigma_F^2}{N_{F_j}} + \frac{\sigma_P^2}{N_{P_j}}} \right)$$

4.3 Verbatim mode

Verbatim mode ignores special characters and other commands specific to \LaTeX . It is useful when copying code from a `.R` or `.tex` file into the report. The text will look slightly different from normal text:

```
prenames <- a1$aux$set.data
onlynames <- prenames
for(i in 1:length(prenames))
  onlynames[[i]] <- names(prenames[[i]])

# Creating the Y array...

Y <- a1$aux$globe
Ynames <- names(Y)
nrows <- length(Y)
ncols <- length(prenames)
```

Note that the use of `$` does not cause a problem, but in ESS the color coding for math mode is still used. If there is an odd number of `$`s, this coloring will overflow into the rest of the document; while visually annoying, there will not be any issues when compiling.

5 Importing Graphics

Graphics are best imported in a center environment. Most pictures are overlarge, so you'll need to scale them down. The `bb=` option stands for "binding box" and essentially cuts out a rectangle from the original picture. The first two numbers are the (x,y) coordinates for the bottom left corner of the picture, while the last two are the (x,y) coordinates for the top right corner. Binding box values can easily be found for postscript (`.ps` or `.eps`) files by opening & viewing the file with `mgv` from the command line. Neither option is necessary, but they are usually quite helpful. I've found that `.ps` files make the best transit into \LaTeX ; just make sure there's only one page in the file. The `bb=` option is flaky, however, and doesn't always work.

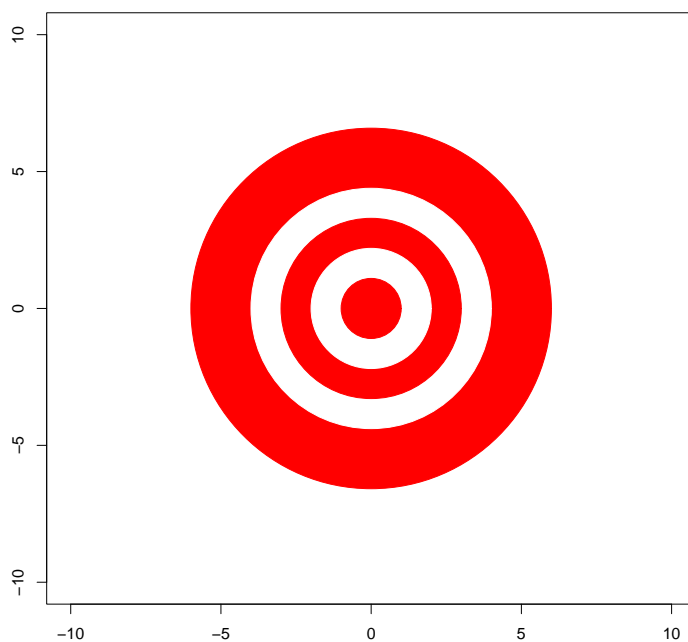


Figure 1: A target made in R using the `symbols()` command

6 Creating Tables

Tables are created in the tabular environment; for formatting reasons, a center environment is also desirable. Consider the code used to generate the table at the bottom of the page:

```
\begin{center}
\begin{tabular}{l||c|c|c|c}
Status & Score = 1 & Score = 2 & Score = 3 & Score = 4 \\
\hline \hline
Healthy & 5 & 1 & 3 & 2 \\
Sick & 8 & 2 & 7 & 9 \\
\end{tabular}
\end{center}
```

The braced tabular options specify how many columns there are (5), the justification for the columns (l-c-c-c-c) and how many (if any) vertical lines there should be between the columns. Horizontal lines between rows are generated by the hline command. The \\ command indicates the end of a row where the 5 elements of the row are separated by a & symbol. Note that & is another special character. Be sure to end the tabular and center environments when the table is complete.

Status	Score = 1	Score = 2	Score = 3	Score = 4
Healthy	5	1	3	2
Sick	8	2	7	9

7 Compiling The Code

From the same directory as the .tex code, execute these commands:

```
latex template
dvips template
ps2pdf template.ps
```

If you want a table of contents, add to or replace the abstract code with `\tableofcontents` and execute these commands:

```
latex template
dvips template
(make a change to the .tex file, undo it and save)
latex template
dvips template
ps2pdf template.ps
```

The duplication is needed since the table of contents is based on the last successfully compiled run.

After generating the .ps or PDF final product, you may want to remove the .aux, .log and .dvi files that are byproducts of the compilation process. Note that these files will be generated each time the latex and dvips commands are called from the Linux command line.