Introducing LaTeXand Sweave

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1 What is LaTeX?

LaTeXis an open source word processor that produces high quality documents. In addition, R commands can be integrated into text to 'weave' data analysis, graphics, and text into a professional finished product.

1.1 Why use LaTeX?

TBD

2 Using R Studio

Before using LaTeX, we need to define how files are 'knited' to create pdf files. After starting R studio, choose the 'Tools' menu item and select global options. On the left, select the 'Sweave' option and make sure the default values match Figure 1.

3 Creating LaTeX Documents

3.1 Document Structure: Preamble

We usually declare the type of document on the first line of the text file, using the command `\documentclass{}`. Inside the curly brackets we specify the type of document that you want, e.g. article, letter, book, minimal, or memoir. In general, I recommend you begin with article.

3.2 Title and Author

The author and title are specified in the preamble with the following commands:

```
\title{This is my title}
\author{This is the author or list of authors}
```

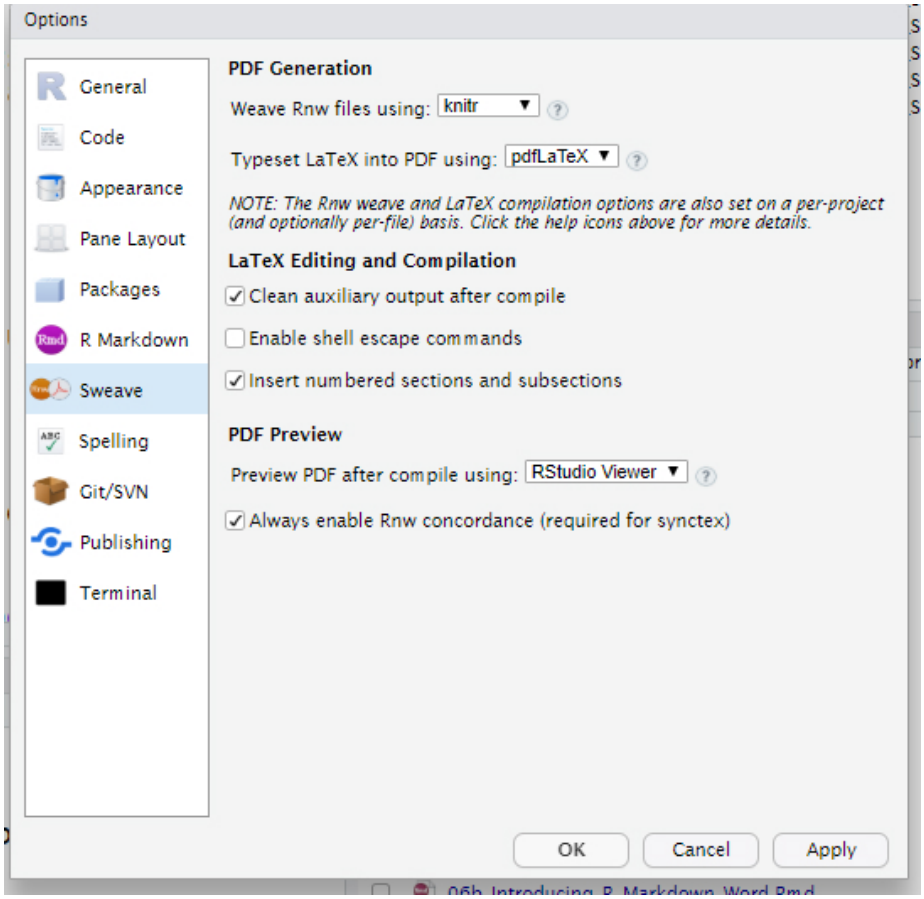

Figure 1: Sweave setup screen shot

3.3 Begin and End

Special blocks are developed within `\begin{}` and `\end{}` commands. For every block, both the begin and end must be present or you will generate errors.

In fact, after the preamble, the documents text is initiated by the `\begin{document}` and ends at `\end{document}`.

3.4 Printing the Title and Author

After the `\begin{document}` is a good time to print the title, author and date of the pdf, which is all done with a `\maketitle` command.

3.5 Sections and Subsections

Each section and subsection (and subsubsection) heading are hierarchically defined and specified with the following commands:

```
\section{This is a section heading}
\subsection{This is a subsection heading}
\subsection{This is a subsubsection heading}
```

Please note, if you define a section, there must be more than one. Similary, if you create a subsection, be sure that it's not alone in the section – otherwise, why have the break at all!

Finally, try to avoid putting text between dropping down into categories. In other words, don't insert a paragraph between a section and a subsection. Define the subsection so that the paragraph is applicable to the subsection and the section.

3.6 Special Characters that Cause Problems

Most special characters are reserved for LaTeXtype setting – see table for some important ones. These often create errors for beginners and experienced users alike, but for beginners the frustration generated by these errors can be overwhelming!

Review Table 1 to appreciate some of these characters (Table 1).

If you are trying to use the characters in the text, then put a backslash in front of them. If you are using them in a type-setting capacity, you should look up how to use them online.

4 Integrating R Commands with Sweave

4.1 Compile PDF workflow

Now the best part of using LaTeXand rstudio is that you can create text that runs the R code as you compile and even use the results in the text.

Table 1: Write a Caption here.

Character	Type Setting Function	Associated Error
%	Percent symbols used to make comment lines and are not printed when compiled.	If you want to print the percent symbol, use `\%`
&	Ambersands are used for tab in tables	When used outside the table environment, you'll get errors, use `\&` if you want to use the symbol in writing.
$	Dollar symbols are use to create 'math' mode blocks, for example if you want to use the Greek letter α, `$\alpha$`	If you really want a dollar sign, then you'll want to use `\$`.

We begin with an Rnw File. When we 'Compile PDF', Rstudio routes the file through a Sweave processe to create a TEXfile. The TEXfile is then compiled into a pdf.

$$\text{Rnw} -> \text{TeX} -> \text{PDF}$$

4.2 R Chunks

R chunks or blocks are delineate with the following code:

```
<<>>=
... R code stuff
@
```

Within the less than and greater than sybols, one can customize how the R block is processed. For more information, one should see other more detailed resources.

4.3 Creating Figures

We intiate figures with `\begin{figure}` and ends with `\end{figure}`. For more information, the reader is directed to one of several online resources on R and LATEX.