

# Multiple L<sup>A</sup>T<sub>E</sub>X Source Files

Howto handle this in CoCalc

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# 1 Introduction

This is an overview about how to write a large L<sup>A</sup>T<sub>E</sub>X document with multiple input sources, where:

- all sub-documents can be previewed by rendering only the partial document,
- the forward/inverse search works,
- SageTeX [Da15] is supported,
- formulas, graphics and the advanced KOMAscript package are enabled.

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## 2 Setup

The general setup of this document is best explained by reading the header of the “master.tex” file.

### 2.1 Bibliography

The bibliography uses `biblatex` and `biber`, which works much more robust than the older `bibtex`. The file “`bibliography.bib`” defines the references in the usual `bibtex` format, and the references work across all sub-documents. It also directly supports special characters. For example, the [Koh14] reference contains the letter “ü”, which is processed and rendered without any issues.

The next chapters are sub-documents. They briefly describe each individual aspect in more detail.

# 1 Makefile

## 1.1 latexmk

latexmk is a versatile utility for building L<sup>A</sup>T<sub>E</sub>X documents. It automatically handles table of content, indices, references and bibliography.

To make it also work well with SageTeX (see page 4), you have to add the file latexmkrc into the current directory. It defines additional dependencies and instructions for building the whole document using SageTeX.

For more information, type a terminal `man latexmk`.

## 1.2 Use make to build the PDF

Finally, one has to tell the CoCalc environment to use instead of the default build command the much more sophisticated Makefile. In order to do so, first add the Makefile to your project, modify it to match your filenames, and then click on the 'build'-button (top right) and change the command to `make 'filename.pdf'`. In our case here, this is `make '10-make.pdf'` or `make 'master.pdf'` for the master document.

Then, SageMathCloud will call the Makefile's definition to build the PDF document.

When enabled correctly, at the bottom of each file (like this one here), this configuration string will appear:

```
%sagemathcloud={"latex_command":"make '10-make.pdf'"}}
```

Do not delete it!

## 2 Subfiles Package

The subfiles  $\LaTeX$  package [Gar12] is able to combine multiple source files in one single document. In contrast to other commands like `\input` or `\include`, it is also possible to render the partial document with the header definitions of the master document.

Also, in the header of each subfile, additional instructions can be embedded. In this example here, `\setcounter{chapter}{1}` sets the counter for the chapter in order to get a consistent numbering. (Otherwise – because  $\LaTeX$  only sees this partial document – it would start its numbering at 1 and not 2.)

## **3 KOMA-Script**

KOMA-Script [Koh14] is a bundle of document classes replacing article, book, letter, etc. It is not required for this multiple source-file demo, but still included for completeness.



## 4 SageTeX

### 4.1 SageTeX and latexmk

latexmk is a versatile utility for building L<sup>A</sup>T<sub>E</sub>X documents. It automatically learns about the inter-dependencies of all documents and generated intermediate files. It uses this information to run and repeatedly re-run various tools to produce a working final document.

To make it work well with SageTeX, the file latexmkrc in the current directory defines additional dependencies and instructions.

For more information, type a terminal `man latexmk`.

To enable SageTeX in combination with latexmk, this page explains how to modify the latexmkrc file:

<https://github.com/dandrake/sagetex/wiki>

Little caveat: to make it work in this demo, a small wrapper script “run-sagetex.py” handles the filename and calling in order to work with SageTeX correctly.

## 4.2 SageTeX Demo

$$1 + 1 = 2$$

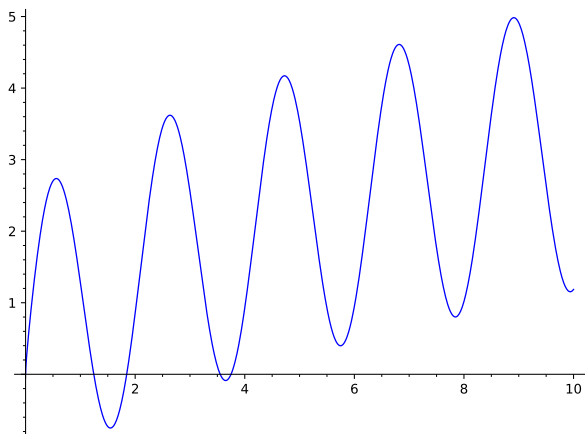
$$(x + 1)^5 \rightarrow x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1$$

Raw Strings:

Defining a function g:

```
a = 2
b = 3
x = var('x')
g = a * sin(b * x) + sqrt(x)
```

And a plot of  $g = \sqrt{x} + 2 \sin(3x)$  from  $[0, 10]$ :



## **5 Conclusion**

## Bibliography

- [Da15] Dan Drake and et. al. *SageTeX Github Repository*. 2015. URL: <https://github.com/dandrake/sagetex>.
- [Gar12] Federico Garcia. *Subfiles L<sup>A</sup>T<sub>E</sub>X package*. 2012. URL: <https://www.ctan.org/pkg/subfiles>.
- [Koh14] Markus Kohm. *KOMA-Script: Eine Sammlung von Klassen und Paketen für L<sup>A</sup>T<sub>E</sub>X 2e*. Lehmanns Media, 2014. URL: <https://www.ctan.org/pkg/koma-script>.