# R Markdown: The One Tool to Rule Them All

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# Table of contents

# Introduction

Welcome to the online book for the Lord of the Rings (LotR) R Markdown workshop.

Through this workshop, you will be provided with the knowledge and skills that you will be able to:

- Create your own R Markdown documents
- Export your R Markdown documents to a range of other formats (HTML, PDF, and Word)
- Work with:
  - Figures and tables
  - Equations
  - References

# Workshop Files

For this workshop you will need the following 3 files:

- `lotr.Rmd`
- `lotr_clean.tsv`
- `lotr_ref.bib`

# Workshops

# Acknowledgements

# About the Author

# 1 Summary

In summary, this book has no content whatsoever.

```
1 + 1
```

```
[1] 2
```

# 2 Output Formats

## 2.1 Section Outline

The section will showcase the different output formats you can create from the same document.

**Teaching Time:** 5 Minutes

**Working Time:** 5 Minutes

## 2.2 Generating Output

### 2.2.1 Knit

You can select the type of output you would like when you "knit" the document. This is just the final stage of the process when you are letting RStudio know what you want to create.

### 2.2.2 `render`

Instead of using the GUI, we can instead use the console to create our document. The type of documents we can create are as follows:

- `html_document`
- `pdf_document`
- `word_document`

By typing the following into console, we can compile our RMarkdown document:

```
rmarkdown::render("lotr.Rmd", output_format = "html_document")
```

## 2.3 YAML

For ease of use, it is often best to define what type of document you would like to create in the text file. This can be done by adding the following to your YAML header

```
title: "Lord of the Rings"
ouput: html_document
```

## 2.4 Exercise

Attempt to generate all three types fo reports:

1. HyperText Markup Language (.html)
2. Portable Document Format (.pdf)
3. Microsoft Word (.docx)

PDF Issues

It is not uncommon to have issues with creating PDF documents. The most common problem is that LaTeX has not been installed. Try the following code:

```
install.packages("tinytex")
tinytex::install_tinytex()
```

If that does not work, the problem may be a little more complex and outside the scope of this workshop.

# 3 Keyboard Shortcuts

## 3.1 Section Outline

The section will make your life easier in the long run.

**Teaching Time:** 5 Minutes

**Working Time:** 0 Minutes

## 3.2 My List

Below is a curated list of shortcuts that can be used for RMarkdown. To show a more extensive list try pressing `Alt+Shift+K` (Windows/Linux) or `Option+Shift+K` (MacOS).

| Action | Windows/Linux | Mac |
|---|---|---|
| Knit document | Ctrl + Shift + K | Cmd + Shift + K |
| Insert chunk | Ctrl + Alt + I | Cmd + Option + I |
| Run current chunk | Ctrl + Alt + C | Cmd + Option + C |
| Run all chunks above | Ctrl + Alt + P | Cmd + Option + P |
| Run all chunks | Ctrl + Alt + R | Cmd + Option + R |
| Un/Comment out a line | Ctrl + Shift + C | Cmd + Shift + C |
| Reformat Code | Ctrl + Shift + A | Cmd + Shift + A |
| Spell-check | F7 | F7 |

## 3.3 Exercise

Using the the document `lotr.Rmd`:

1. Format the code in the code chunk labelled `ugly_code`, and
2. Check for any spelling mistakes.

# 4 Tables and Figures

## 4.1 Section Outline

The section will assist you with including tables and figures into your RMarkdown document.

**Teaching Time:** 10 Minutes

**Working Time:** 5 Minutes

## 4.2 Tables

## 4.3 Figures

### 4.3.1 Generated

### 4.3.2 External

### 4.3.3 Chunk options

Below is a curated list of chunk options for figures. As you learn more, this list might vary for you.

Table 4.1: Chunk Options for Figures

| Option | Description |
|---|---|
| `fig.height` | Height of the figure in inches. (Coded as 9 not "9") |
| `fig.width` | Width of the figure in inches. (Coded as 9 not "9") |
| `fig.align` | Where do you want your figure i.e. `default`, `centre`, `left`, or `right`? |
| `fig.cap` | Add a caption to your figure. |

Each of these options can be defined in each chunk of you can define them globally *(best included in your first code chunk)*:

```
knitr::opts_chunk$set(chunk_option1 = TRUE, chunk_option2 = FALSE, ...)
```

**!** Important

Best practice is to save all your figures. This can be done by inserting the following code into your YAML header:

```
output:
  html_document:
    keep_md: true
```

**Note:** This code will be different if you are using a different output format.

### 4.3.4 Exercise

Change the figure in `lotr.Rmd` to have:

- a height of 5 inches, and
- a width of 3 inches.

Make sure to save the image as well. Can you locate the saved image in your files?

# 5 Citing

## 5.1 Section Outline

The section will assist you with including citations and referencing in your document.

**Teaching Time:** 10 Minutes

**Working Time:** 5 Minutes

## 5.2 Bibliography

If you are still deciding of a referencing pipeline, I would suggest **Zotero** and **Better Bibtex** *(More information can be provided outside this workshop).*

In your YAML header you need to define your bibliography file i.e.

```
output: html_document
bibliography: refs.bib
```

and then you are able to define your citation style:

```
output: html_document
bibliography: refs.bib
csl: apa.csl
```

To cite an object from your bibliography, you use `[@ref-handle]` where `@ref-handle` matches the desired object from your bibliography.

## 5.3 Figures, Tables, and Sections

- **Figures:** `\@ref(fig:chunk-name))`
- **Tables:** `\@ref(tab:chunk-name))`
- **Sections:** `\@ref(sec-name)`

For figures and tables, `chunk-name` is defined at the top of each chunk. Sections are named in the following way:

```
## Section 1 {#sec-name}
```

## 5.4 Equations

To reference an equation you must first name that equation `(\#eq:label)` where `label` is the name you select.

To reference this equation you use type `\@ref(eqn:label)`.

> **!** Important
>
> You must define the equation in LaTeX using:
>
> ```
> \begin{equation} (\#eqn:label)
> ...
> \end{equation}
> ```

## 5.5 Exercise

Reference the following:

1. Either the plot or figure, and
2. One journal article from the bibliography provided.

# 6 Mathematics

## 6.1 Section Outline

The section will assist you creating and including mathematical equations in your Markdown documents.

**Teaching Time:** 5 Minutes

**Working Time:** 5 Minutes

## 6.2 Creating LaTeX code

### 6.2.1 New Equations

Consider the equation $y = mx + b$, this can be written inline as

```
$y = mx+b$
```

or it can be written as

$$y = mx + b$$

```
$$
y = mx+b
$$
```

In your own time, please consider having a look at LaTeX-Tutorial.com

### 6.2.2 Borrowed Equations

With the the range of external tools available, it is very easy to take equations from external sources and convert that equation to LaTeX.

#### 6.2.2.1 HTML

If you are looking at an equation on a HTML document, the code can easily be copied by:

1. Right clicking the desired equation
2. Selecting "Show Math As" then "TeX Commands"
3. Copy the LaTeX code that is shown.

#### 6.2.2.2 Other Sources

If you do not have access to a HTML version of your equation, Mathpix is a AI powered document conversion technology.

We will not cover hot to use this tool, but it can be extremely helpful in many different situations.

> **Note**
>
> There are currently two free versions of the Mathpix subscription

## 6.3 Exercise

Can you put the following equation into your working RMarkdown document?

$$\text{Maybe} = \frac{\text{Yes}}{\text{No}} + \frac{\text{No}}{\text{Yes}}$$

# References