

# Maintaining A Slide Rule Web Site

- Mike Syphers
- <http://followingtherules.info>

The screenshot shows the website 'Following the Rules' with a dark sidebar navigation menu and a light-colored main content area. The sidebar lists various topics such as 'Introduction', 'Review of the Logarithm', 'Computing Logarithms', 'Slide Rule ABC's and D's', 'Collection Overview', 'The Slide Rule Collection', 'The Collection in Photos', 'Collection Scale Sets', 'Special Groupings', 'Books, Manuals, and Sheets', 'Vignettes', 'Appendices', 'Short Slide Rule History', 'Common Slide Rule Scales', 'Some Collection Statistics', 'References for Individual Rules', 'Data Frame Properties', 'Site Tips', 'About this Web Site', 'About the Author', and 'References'. The main content area features the title 'Following the Rules — A Slide Rule Collection' and a navigation table.

<i>New to slide rules? Let's get started !</i>			
<i>New Rules</i>	<i>Vignettes</i>	<i>Site Tips</i>	
<i>Latest Vignette:</i>		K&E Beginner's Rules	
<b>Collection Overview</b>	Rule Makers	Collection Photos	Special Groupings
Logarithm Review	Slide Rule Basics	Slide Rule Scales	References

Below the table are three images: a slide rule in its case, a slide rule in its open case showing the scales, and a slide rule in its case with a pencil.

Welcome! This database-driven web site presents a personal collection of slide rules as well as other useful information about slide rules in general, their operation and use. Click the "right arrow" > on this web page or hit the right arrow key on the keyboard to go to the next page. Or, use the left navigation pane to go directly to a particular chapter or subject.

-Mike Syphers

About This Web Site	About the Author	
The Oughtred Society	14 August 2021	International Slide Rule Museum

Published with bookdown

# Why a Web Site?

- Basically, wanted to keep track of my collection as it was building up
  - do I have one of these? what condition is it in?
  - with my phone, an online list can be viewed from anywhere
- Eventually, others would ask me question about my collection, about slide rules in general — how do they work? what can they do?
  - so, wanted to explain logarithms, slide rule use, especially for *newbies*
- Pandemic hit and in 2020 I became “semi-retired” — perfect time to work on a new web site!



# Earlier Attempts

Maker	Model	Year	Serial	Case	Notes	References
Keuffel & Esser	4041	1900-1906	"A11"	no	Rule in decent condition; quite yellowed; prod. mark "A11" on end of rule; square metal/glass cursor; no model number on rule	<a href="http://www.mccoys-kecatalogs.com/KECatalogs/1901/1901kecata294.htm">http://www.mccoys-kecatalogs.com/KECatalogs/1901/1901kecata294.htm</a> , <a href="http://www.mccoys-kecatalogs.com/Dating.htm#Specials">http://www.mccoys-kecatalogs.com/Dating.htm#Specials</a>
Keuffel & Esser	4053-3	1910-1914	"374"	no	good condition; no cursor; prod. marks "374" on end of rule	<a href="http://www.sliderrule.ca/4053.htm">http://www.sliderrule.ca/4053.htm</a> ; <a href="http://www.mccoys-kecatalogs.com/y24_2_056-61.pdf">http://www.mccoys-kecatalogs.com/y24_2_056-61.pdf</a> ; <a href="http://sliderrulemuseum.com/SR_Data.htm#KE">http://sliderrulemuseum.com/SR_Data.htm#KE</a>
Keuffel & Esser	4088-3	1913-1914	"55"	box	good condition, box too; prod. marks "55" on end of rule	<a href="http://www.mccoys-kecatalogs.com/KECollection/4088/ke4088-3_1.htm">http://www.mccoys-kecatalogs.com/KECollection/4088/ke4088-3_1.htm</a>
Keuffel & Esser	4041	1915-1921	"207"	box	Rule in good condition; prod. mark "207" on end of rule	<a href="http://www.mccoys-kecatalogs.com/KECollection/4041/ke4041family.htm">http://www.mccoys-kecatalogs.com/KECollection/4041/ke4041family.htm</a>
Keuffel & Esser	4058	1915-1925		no	"Student's Rule"; nice condition	<a href="http://www.mccoys-kecatalogs.com/KEModels/ke4058family.htm">http://www.mccoys-kecatalogs.com/KEModels/ke4058family.htm</a>
Keuffel & Esser	4088-3	1916-1922	"324"	box	Rule in good condition; prod. mark "324" on end of rule	<a href="http://www.mccoys-kecatalogs.com/Dating.htm">http://www.mccoys-kecatalogs.com/Dating.htm</a> ; <a href="http://www.mccoys-kecatalogs.com/KEModels/ke4088-3family.htm">http://www.mccoys-kecatalogs.com/KEModels/ke4088-3family.htm</a>
Keuffel & Esser	4058	1916-1922		no	good condition; very early 4058	<a href="http://www.mccoys-kecatalogs.com/KECollection/4058/ke4058family.htm">http://www.mccoys-kecatalogs.com/KECollection/4058/ke4058family.htm</a>
Keuffel & Esser	4088-3	1923	35516	no	good condition	<a href="http://sphere.bc.ca/test/ke/320-ke_date2.jpg">http://sphere.bc.ca/test/ke/320-ke_date2.jpg</a> ; <a href="http://www.gizmo-sliderrules.ke.htm">http://www.gizmo-sliderrules.ke.htm</a>
Keuffel & Esser	4092-3	1923	54405	yes	good condition; serif type; Doc McClain; stitched case	<a href="http://sphere.bc.ca/test/ke/320-ke_date2.jpg">http://sphere.bc.ca/test/ke/320-ke_date2.jpg</a> ; <a href="http://www.gizmo-sliderrules.ke.htm">http://www.gizmo-sliderrules.ke.htm</a>
Keuffel & Esser	N4053-3	1925	140188	yes	stitched case; C.H. Drake, O.S.C.	<a href="http://sliderrulemuseum.com/Manuals/KE_Data.jpg">http://sliderrulemuseum.com/Manuals/KE_Data.jpg</a>
Keuffel & Esser	4092-3	1927	277453	yes	stitched case; missing flap	<a href="http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm">http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm</a>
Keuffel & Esser	4092-3S	1928	295472	yes	stitched case; R.W. Bluhm	<a href="http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm">http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm</a>
Keuffel & Esser	4092-3S	1931	441408	yes	stitched case; J.A.S.	<a href="http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm">http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3.htm</a>
Keuffel & Esser	4056W	1930-34		box	Beginner's Rule; wood cursor frame	<a href="http://www.mccoys-kecatalogs.com/KECollection/4056/ke4056family.htm">http://www.mccoys-kecatalogs.com/KECollection/4056/ke4056family.htm</a>
Keuffel & Esser	N4053-5	1934	633513	yes	20" slide rules; very nice condition	<a href="http://www.mccoys-kecatalogs.com/Dating.htm">http://www.mccoys-kecatalogs.com/Dating.htm</a>
Keuffel & Esser	4056W	1936-43		box	Beginner's Rule	<a href="http://www.mccoys-kecatalogs.com/KECollection/4056/ke4056family.htm">http://www.mccoys-kecatalogs.com/KECollection/4056/ke4056family.htm</a>
Keuffel & Esser	N4041	1938	533538	box	rule, box in nice condition	<a href="http://www.mccoys-kecatalogs.com/KEModels/ke4041family.htm">http://www.mccoys-kecatalogs.com/KEModels/ke4041family.htm</a>
Keuffel & Esser	4054	1945	219546	yes	nice box; broken cursor block	<a href="http://sliderrulemuseum.com/KE_Standard.htm">http://sliderrulemuseum.com/KE_Standard.htm</a>
Keuffel & Esser	4055	1949	568414	yes		<a href="http://sliderrulemuseum.com/KE_Standard.htm">http://sliderrulemuseum.com/KE_Standard.htm</a>
Keuffel & Esser	4081-3	1949	589003	yes	very worn-out case; "U. Illinois" engraved, as well as "Gates"	<a href="http://www.mccoys-kecatalogs.com/KECollection/4081-3/ke4081-3.htm">http://www.mccoys-kecatalogs.com/KECollection/4081-3/ke4081-3.htm</a>
Keuffel & Esser	4080-1	1951	762328	yes	ribbed leather case; McIntyre	<a href="http://www.mccoys-kecatalogs.com/KECollection/4080-1/ke4080-1.htm">http://www.mccoys-kecatalogs.com/KECollection/4080-1/ke4080-1.htm</a>

kept copy of spreadsheet in a DropBox file, accessible from anywhere (above, from 2017)

eventually, added pictures of slide rules on a Google web site:

SyPhy.com

Slide Rules

Slide Rule Collection

Quick References:

- [Beginner's Guide](#)
- [All About Slide Rules](#)
- "When Slide Rules Ruled" by Clifford Stall

Full Collection:

- [Following The Rules](#)

Sample Rules from the collection...

Keuffel and Esser, USA

Model 4041, c. 1905

Later, started creating pdf with tables and sometimes pictures, which then was posted on the Google web site:

Slide Rule Collection

Mike Syphers

5/22/2018

Total Slide Rules in collection: 89

	Count
Alco	1
Boykin	1
C-Thru	1
Dietzgen	6
Engineering Instruments	1
Faber-Castell	5
Factory10	1
Gilson	1
Goodyear	1
K&E	25
Lawrence	1
MATSKU	1
noID	4
Otis King	1
Pickett	16
Post-Sun-Hemmi	14
Relay-Richo	1
Rietz	2
Stanley	1
Sterling	3
Takeda	1
Unique	1

Keuffel and Esser, USA

Total number of K&E slide rules in the collection: 25.

Model	Year	Serial	Case	Notes
4041	1900-1906	A11	no	Rule in decent condition; quite yellowed; prod. mark "A11" on end of rule; square metal/glass cursor; no model number on rule
4053-3	1910-1914	374*	no	good condition; no cursor; prod. marks 374* on end of rule
4088-3	1913-1914	55	box	good condition, box too; prod. marks "55" on end of rule
4041	1915-1921	207	box	Rule in good condition; prod. mark "207" on end of rule
4058	1915-1925		no	Student's Rule; nice condition
4088-3	1916-1922	324	box	Rule in good condition; prod. mark 324 on end of rule

# Spreadsheet vs. Database

- Essentially the same thing, in this context
- The “database” itself is still maintained as a text file (.csv), which can be accessed and edited with a variety of tools: Excel, Numbers, simple text editor, etc.
- Variables maintained:
  - Maker, Model, Year, Length, Scales, ...
  - plus, photo(s) of each slide rule (the .csv file keeps the file names of the photos, while the files themselves are maintained in a separate folder)



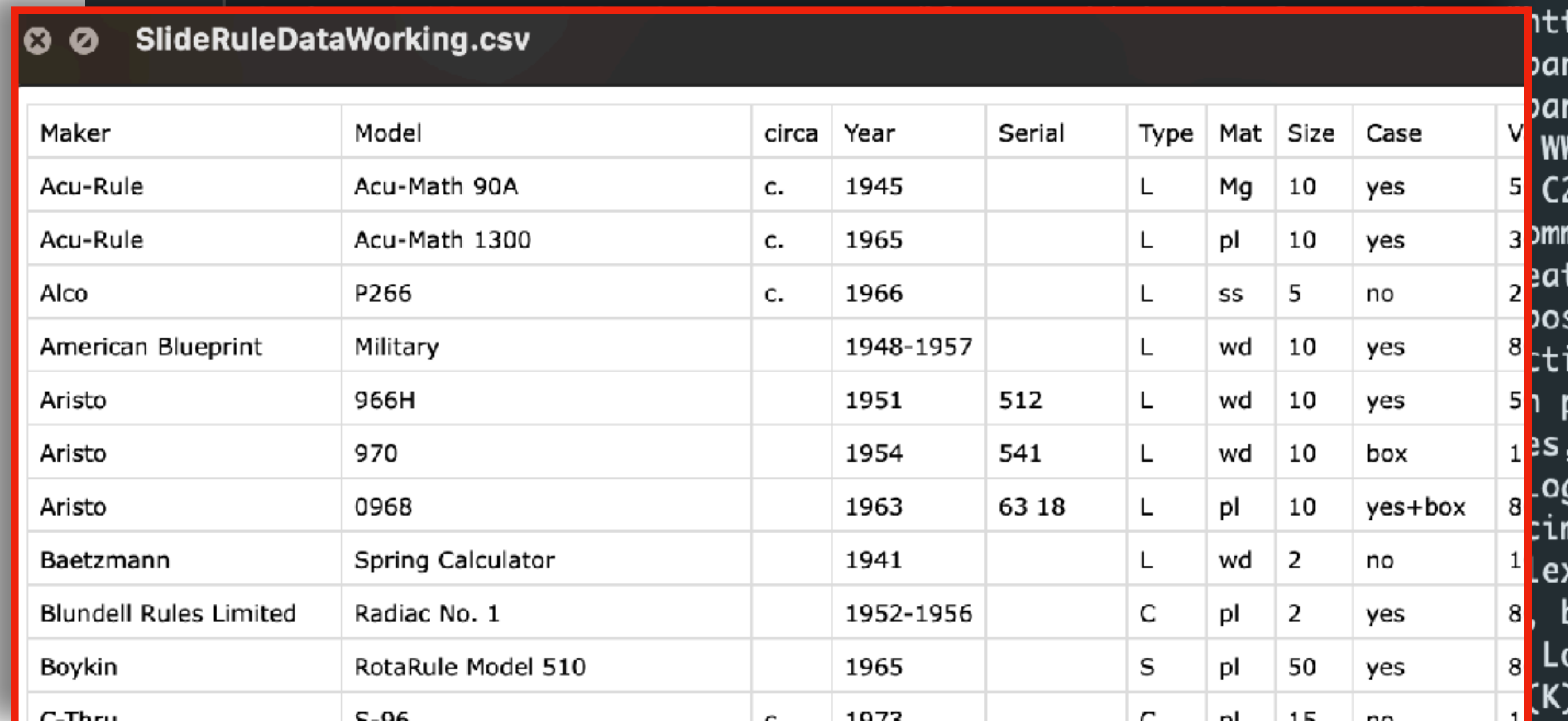
# The database File

- A simple, easy-to-edit list of data for each slide rule. Items can be entered in any order, though I usually list in alphabetical order according to Maker — easy to find things when scanning through this large text file

```
~/Desktop/SRworking/database/SlideRuleDataWorking.csv ↕
1 "Maker", "Model", "circa", "Year", "Serial", "Type", "Mat", "Size", "Case", "V
2 Acu-Rule, Acu-Math 90A, c., 1945,, L, Mg, 10, yes, 50, "St. Louis, Mo., USA; M
3 Acu-Rule, Acu-Math 1300, c., 1965,, L, pl, 10, yes, 30, "Log Log Decimal Trig;
4 Alco, P266, c., 1966,, L, ss, 5, no, 25, "Made in Japan; all metal; addiator/st
5 American Blueprint, Military,, 1948-1957,, L, wd, 10, yes, 80, "US Military s
6 Aristo, 966H,, 1951, 512, L, wd, 10, yes, 50, "made in 1951 Lot 2 Hamburg; Denr
7 Aristo, 970,, 1954, 541, L, wd, 10, box, 120, "made in 1954 Lot 1 Hamburg; Ari
8 Aristo, 0968,, 1963, 63 18, L, pl, 10, yes+box, 80, "Aristo-Studio, case
9 Baetzmann, Spring Calculator, , 1941,, L, wd, 2, no, 100, "Spring Load Calcul
10 Blundell Rules Limited, Radiac No. 1, , 1952-1956,, C, pl, 2, yes, 80, "radi
11 Boykin, RotaRule Model 510,, 1965,, S, pl, 50, yes, 800, "Original box, case,
```

- Can use a text editor, or a spreadsheet program, etc., for editing the data

- With all this info, HOW and What to show?



Maker	Model	circa	Year	Serial	Type	Mat	Size	Case	V
Acu-Rule	Acu-Math 90A	c.	1945		L	Mg	10	yes	5
Acu-Rule	Acu-Math 1300	c.	1965		L	pl	10	yes	3
Alco	P266	c.	1966		L	ss	5	no	2
American Blueprint	Military		1948-1957		L	wd	10	yes	8
Aristo	966H		1951	512	L	wd	10	yes	5
Aristo	970		1954	541	L	wd	10	box	1
Aristo	0968		1963	63 18	L	pl	10	yes+box	8
Baetzmann	Spring Calculator		1941		L	wd	2	no	1
Blundell Rules Limited	Radiac No. 1		1952-1956		C	pl	2	yes	8
Boykin	RotaRule Model 510		1965		S	pl	50	yes	8
G-Thru	S-96	c.	1973		C	pl	15	no	

# Web Site Requirements

- visuals of the collection
- tables of information from the collection
- graphs, plots, lists; a variety of selections and sub-groups
- totals, sums, etc. — a variety of analyses
- educational material:
  - introduction to logarithms, slide rule basics
  - short stories/articles (*vignettes*) of slide rule use, collecting, techniques, ...
  - links to other info
- appendices, with links, tips, references, “about” info, etc.

# How Best to Show Everything?

- Pictures? Text? Summary Table(s)? Stories? References?
- Sort by Maker? by Year? by Type? Size? Scales?

**How About ALL OF THE ABOVE?**

# Enter: R and RStudio

- Have used R as a programming language since about 2000
  - works on all platforms: PC, Mac, Linux, etc.
  - open source software: free! Free! FREE!
    - (became my replacement for Mathcad, when price got out of hand)
- RStudio is an interface to R. RStudio also allows for creation of “markup” documents, which can produce reports and articles in pdf, html, and other output from a single input document
  - allows for rendering of complicated equations via *LaTeX*, and background computations that can be directly inserted into the document



# Running R from Rstudio

The screenshot displays the RStudio interface. The top toolbar includes icons for file operations and a menu bar with 'Files', 'Plots', 'Packages', 'Help', and 'Viewer'. The 'Files' and 'Plots' tabs are circled in red. The main workspace shows a scatter plot with x-axis values 1 to 5 and y-axis values 1, 4, 9, 16, 25. The bottom toolbar includes 'Environment', 'History', 'Connections', and 'Tutorial', with 'Environment' circled in red. The Environment pane shows the following data:

Variable	Type	Value
x	num [1:5]	1 2 3 4 5
y	num [1:5]	1 4 9 16 25

```
R version 4.1.0 (2021-05-18) -- "Camp Pontanezen"
Copyright (C) 2021 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin17.0 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

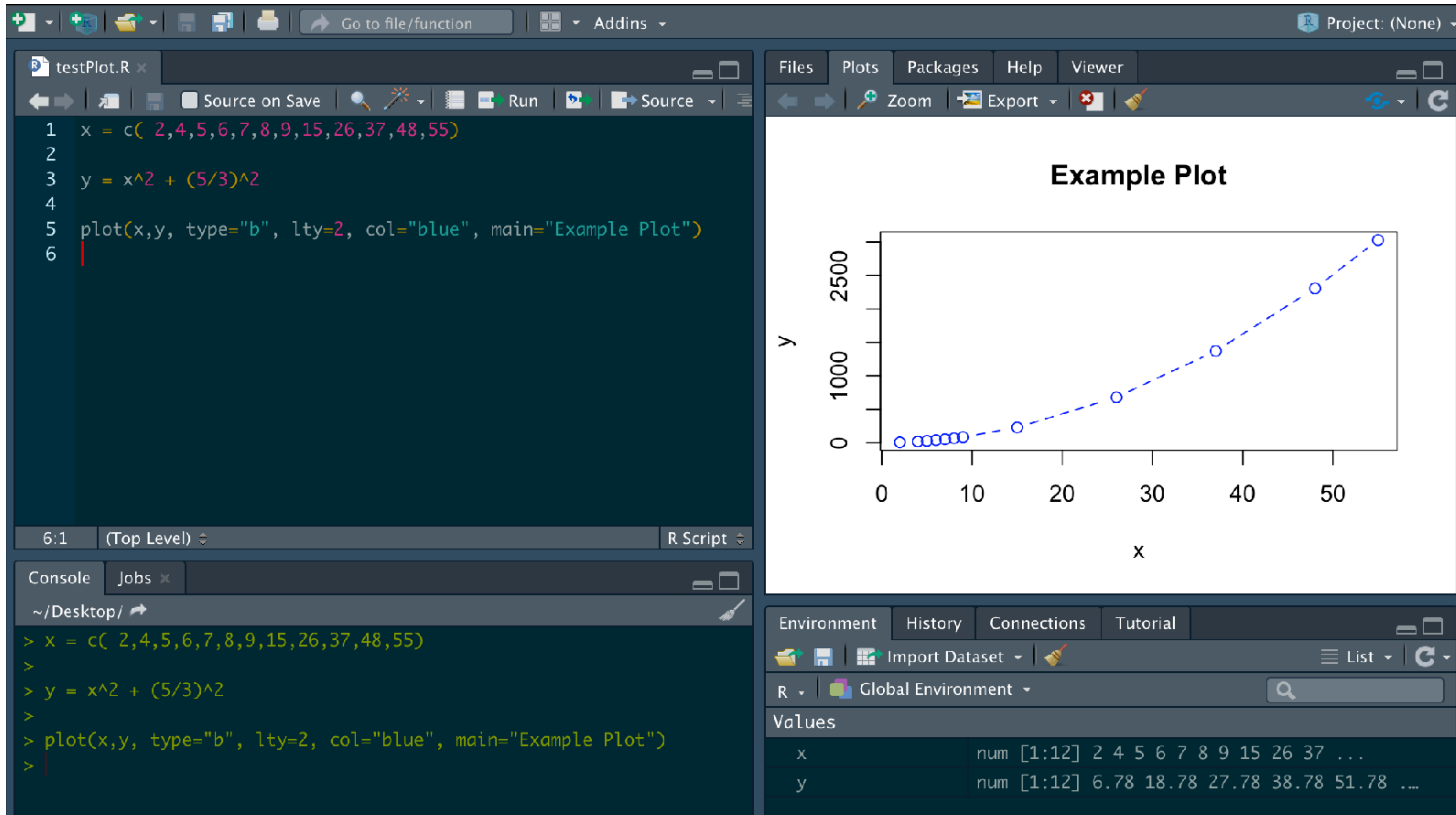
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> 4/5
[1] 0.8
> sqrt(30)
[1] 5.477226
>
> x=c(1,2,3,4,5)
> y = x^2
> y
[1] 1 4 9 16 25
> plot(x,y)
>
```

# An R Program

(using RStudio)



The screenshot displays the RStudio interface. The top-left pane shows the source code for a file named 'testPlot.R'. The code consists of six lines:

```
1 x = c( 2,4,5,6,7,8,9,15,26,37,48,55)
2
3 y = x^2 + (5/3)^2
4
5 plot(x,y, type="b", lty=2, col="blue", main="Example Plot")
6
```

The top-right pane shows a plot titled 'Example Plot'. The x-axis is labeled 'x' and ranges from 0 to 50. The y-axis is labeled 'y' and ranges from 0 to 2500. The plot displays a series of blue open circles connected by a dashed blue line, showing a clear upward trend.

The bottom-left pane shows the console output, which matches the code entered in the source editor:

```
> x = c( 2,4,5,6,7,8,9,15,26,37,48,55)
>
> y = x^2 + (5/3)^2
>
> plot(x,y, type="b", lty=2, col="blue", main="Example Plot")
>
```

The bottom-right pane shows the Environment pane, which displays the variables 'x' and 'y' with their respective values:

Variable	Class	Values
x	num	[1:12] 2 4 5 6 7 8 9 15 26 37 ...
y	num	[1:12] 6.78 18.78 27.78 38.78 51.78 ...

# An Rmarkdown Document

The screenshot displays the RStudio interface with an R Markdown document open. The left pane shows the source code, and the right pane shows the rendered HTML output.

```
1 ---
2 title: "Document using R Markdown"
3 author: "MJ Syphers"
4 date: "August 2021"
5 output: html_document
6 ---
7
8 This is an R Markdown document. Markdown is a simple formatting
9 syntax for authoring HTML, PDF, and MS Word documents. See
10 <http://rmarkdown.rstudio.com>.
11
12 When you click the Knit button a document will be generated that
13 includes both content as well as the output of any embedded R code
14 chunks within the document. You can embed an R code chunk like this:
15
16 

```
{r}
17 x = c( 2,4,5,6,7,8,9,15,26,37,48,55)
18 y = x^2 + (5/3)^2
19 plot(x,y, type="b", lty=2, col="blue", main="Example Plot")
20 
```


21
22 We can also include chunks of R code, but hide them by turning
23 off "echo". Thus, calculations can be performed "behind the scenes"
24 and their results used in what's presented on the screen.
```

The rendered output on the right shows the following content:

## Document using R Markdown

MJ Syphers

August 2021

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. See <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
x = c( 2,4,5,6,7,8,9,15,26,37,48,55)
y = x^2 + (5/3)^2
plot(x,y, type="b", lty=2, col="blue", main="Example Plot")
```

**Example Plot**



# An Rmarkdown Document

The screenshot displays the RStudio interface with an R Markdown document open. The left pane shows the source code, and the right pane shows the rendered output.

```
18
19 We can also include chunks of R code, but hide them by turning
20 off "echo". Thus, calculations can be performed "behind the scenes"
21 and their results used in what's presented on the screen.
22
23 ```{r, echo=FALSE}
24 a = 22.5 # semi-major axis
25 b = 12.67 # semi-minor axis
26 Aell = pi*a*b # Area of the ellipse
27 ```
28 The area of an ellipse is given by
29 $$
30 A_{ell} = \pi \cdot a \cdot b
31 $$
32
33 The area of an ellipse with semi-major and semi-minor axes of
34 lengths `r a` and `r b` respectively, is $A_{ell}$ = `r
35 round(Aell,2)`.
36
```

The rendered output on the right shows a plot of the area of an ellipse as a function of the semi-major axis length. The x-axis is labeled 'x' and ranges from 0 to 50. The y-axis is labeled 'y' and ranges from 0 to 3000. The plot shows a series of blue circles connected by a dashed blue line, representing the area of an ellipse for various semi-major axis lengths. The area increases quadratically with the semi-major axis length.

We can also include *chunks* of **R** code, but hide them by turning off "echo". Thus, calculations can be performed "behind the scenes" and their results used in what's presented on the screen.

The area of an ellipse is given by

$$A_{ell} = \pi \cdot a \cdot b$$

The area of an ellipse with semi-major and semi-minor axes of lengths 22.5 and 12.67 respectively, is  $A_{ell} = 895.59$ .



# Rmarkdown Documents

- An Rmd document can contain text, equations, figures, computations and plots; results of embedded calculations can be displayed within the text itself. If a numerical value is updated later (like the number of K&E slide rules in the collection) through the input of new data or a revision of a calculation, the values within the text/report will be updated automatically.
- From a single document, with just the re-selection of a few options, one can create pdf, html, or other output
  - once html created, can \*post\* the document on a web site

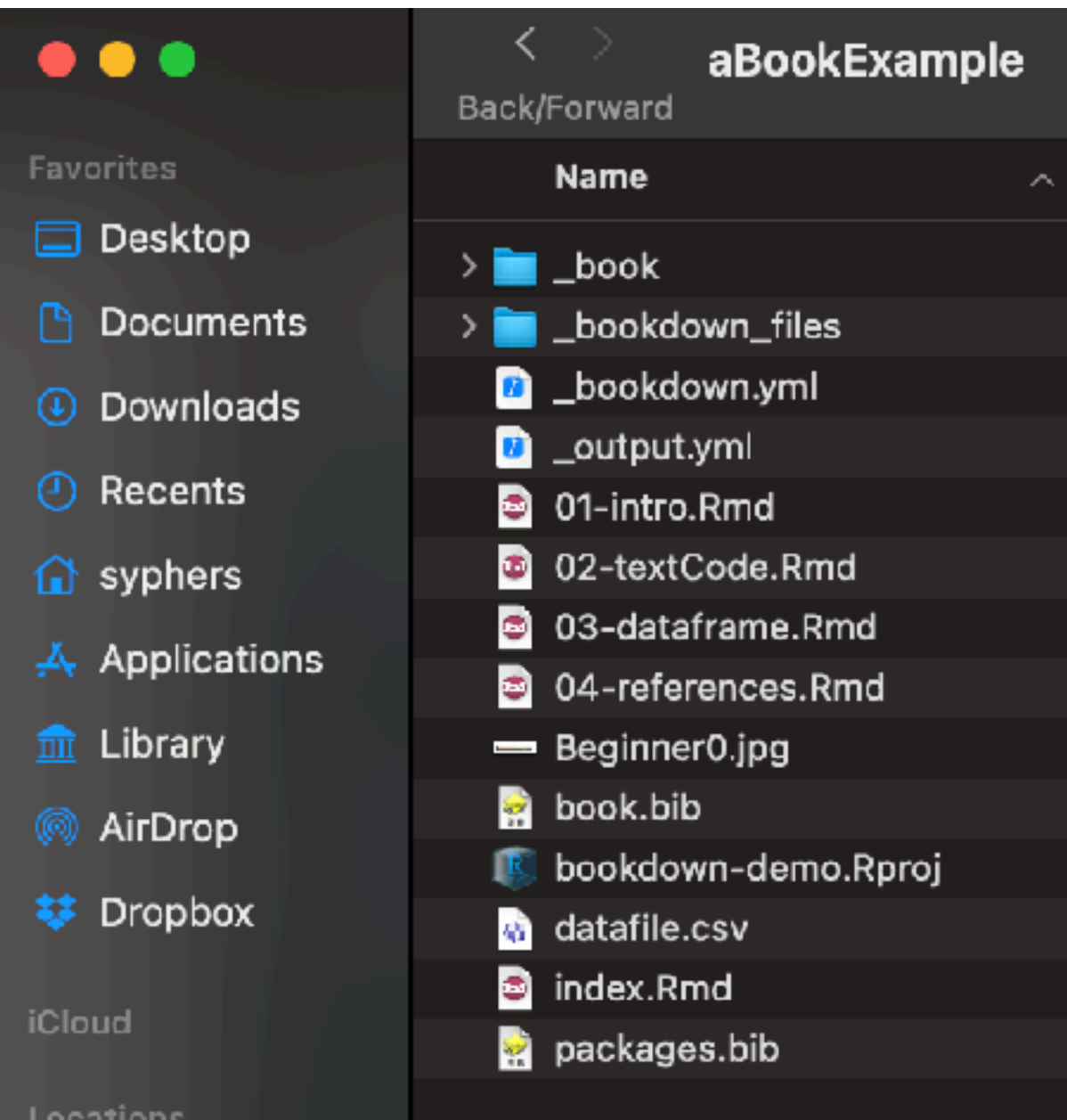
# The Magic Behind the Scene

- *pandoc*:
  - software that scans (or, *pans*) a *document* in search of certain commands or formats, and executes software accordingly, then takes the various results and *knits* them into a single final document
- when “knit” the Rmarkdown document, *pandoc* will
  - scan to look for code chunks — then execute the code and, if tables/images are created, will set these aside for later
  - scan again and look for equations and such (LaTeX-style) and produce images of the equations, setting these aside
  - scan through the text and see if there is any code embedded in the text ( e.g., “... the resulting amplitude will be ``r round( sqrt(x^2+y^2), 3)` cm ...`” ) and will substitute text output for the computed output
  - will pan through the original document several times until all references to variables and images, etc. are resolved. THEN, will produce a final document in the chosen output format — html, pdf, etc.

# Using the Bookdown Package

- RStudio has a very large number of “packages” that can be downloaded and *included* in the environment, providing many new options for execution.
  - *Bookdown* is a separate package that can be loaded into the R environment. It produces a book-like document in the end, which can be in a number of formats, like pdf, html, e-book, etc. It expects things to be in “chapter” form and can have appendices, references, etc. included. *This is what I use to create the web site.*
  - projectName.Rproj
    - executing this file starts up RStudio in the appropriate mode, making the correct file/folder associations, etc.
  - \_bookdown.yml
    - in this file is a list the other files that contain the “chapter” material, in order of desired execution
  - index.Rmd
    - this is the main (and first) input file, which will create the final index.html for the web
  - \_book and \_bookdown\_files
    - *Bookdown* will generate these folders; they will contain all of the final output files
  - a simple book example...

# Using the Bookdown Package



A screenshot of RStudio showing the R Markdown source code and its rendered HTML output. The source code in the editor includes:

```
1 ---
2 title: "A Bookdown Example for a Web Site"
3 author: "Mike Syphers"
4 date: "`r Sys.Date()`"
5 description: "This is a small example of using the bookdown package to write an
6 online book. The output format for this example is bookdown::gitbook."
7 site: bookdown::bookdown_site
8 output: bookdown::gitbook
9 always_allow_html: true
10 documentclass: book
11 bibliography: [book.bib, packages.bib]
12 biblio-style: apalike
13 link-citations: yes
14 ---
15 # {-}
16
17 This is a sample book written in Markdown. You can use anything that
18 Pandoc's Markdown supports, e.g., a math equation  $a^2 + b^2 = c^2$ .
19
20 The bookdown package can be installed from CRAN or Github:
21
22 

```
{r eval=FALSE}
23 install.packages("bookdown")
24 
```


25 Remember each Rmd file contains one and only one chapter, and a chapter is defined
```

The rendered HTML output in the Viewer pane shows the following content:

## A Bookdown Example for a Web Site

Mike Syphers

2021-08-21

This is a *sample* book written in **Markdown**. You can use anything that Pandoc's Markdown supports, e.g., a math equation  $a^2 + b^2 = c^2$ .

The **bookdown** package can be installed from CRAN or Github:

Environment History Connections Build Tutorial  
Build Book More  
370e.html --matnjax --citeproc  
Output created: \_book/index.html

```
1 book_filename: "bookdown-demo"
2 rmd_files: [
3 "index.Rmd",
4 "01-intro.Rmd",
5 "02-textCode.Rmd",
6 "03-dataframe.Rmd",
7 "04-references.Rmd"
8 ]
9
```



# A Bookdown Example

```
1 # Introduction {#intro}
2
3 You can label chapter and section titles using `{#label}` after them, e.g., we can reference
  Chapter \@ref(intro). If you do not manually label them, there will be automatic labels anyway,
  e.g., Chapter [Introduction].
4
5 Figures and tables with captions will be placed in `figure` and `table` environments,
  respectively.
6
7 ```{r nice-fig, fig.cap='Here is a nice figure!', out.width='80%', fig.asp=.75,
  fig.align='center'}
8 x = c(0,2,5,7,9,12,21,32)
9 y = x^2
10 plot(x,y, type = 'b', pch = 19)
11 ```
12
13 Reference a figure by its code chunk label with the `fig:` prefix, e.g., see Figure
  \@ref(fig:nice-fig). Similarly, you can reference tables generated from `knitr::kable()`, e.g.,
  see Table \@ref(tab:nice-tab).
14
15 ```{r nice-tab, tidy=FALSE}
16 knitr::kable(
17   cbind(x,y),
18   caption = 'Here is a nice table!',
19   booktabs = TRUE
20 )
21 ```
22
23 You can write citations, too. For example, we are using the bookdown package [R-bookdown] in
  this sample book, which was built on top of R Markdown [R-rmarkdown] and knitr [xie2015].
24
```

## 1 Introduction

You can label chapter and section titles using `{#label}` after them, e.g., we can reference Chapter 1. If you do not manually label them, there will be automatic labels anyway, e.g., Chapter [Introduction].

Figures and tables with captions will be placed in `figure` and `table` environments, respectively.

```
x = c(0,2,5,7,9,12,21,32)
y = x^2
plot(x,y, type = 'b', pch = 19)
```

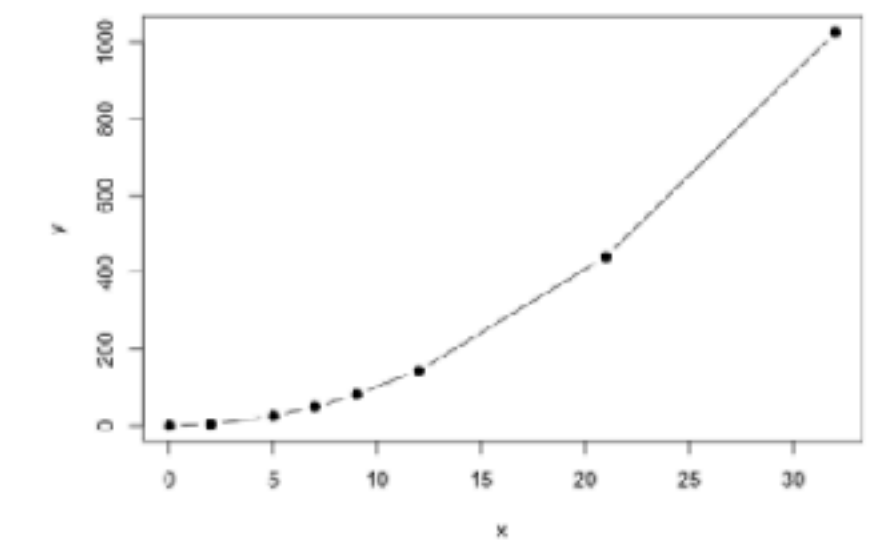


Figure 1.1: Here is a nice figure!

Reference a figure by its code chunk label with the `fig:` prefix, e.g., see Figure 1.1. Similarly, you can reference tables generated from `knitr::kable()`, e.g., see Table 1.1.

```
knitr::kable(
  cbind(x,y),
  caption = 'Here is a nice table!',
  booktabs = TRUE
)
```


Table 1.1: Here is a nice table!

x	y
0	0
2	4
5	25
7	49
9	81
12	144
21	441
32	1024

You can write citations, too. For example, we are using the **bookdown** package [Xie 2021] in this sample book, which was built on top of R Markdown [Alaire et al. 2021] and **knitr** [Xie 2015].

# A Bookdown Example

```
index.Rmd x 01-intro.Rmd x 02-textCode.Rmd* x 03-dataframe.Rmd x
← → ABC 🔍 Knit ⚙️ ⏪ ⏩ Run
1 # Example Text with Code
2
3 Here is an example of a code chunk that creates a Log Scale.
4
5 ```{r}
6 plot(0,0,ty="n",xlim=c(0,10),ylim=c(0,3),xlab="Length along rule [inches]",ylab="",yaxt="n",
7      main="Making a Log Scale")
8 text(10*log10(c(1:10)),c(1:10)*0+2,c(1:10))
9 abline(h=1.4)
10 segments(10*log10(c(1:10)),1,10*log10(c(1:10)),1.8,lwd=2,col="blue")
11 segments(10*log10(seq(1,10,0.1)),1.3,10*log10(seq(1,10,0.1)),1.5,lwd=1,col="blue")
12 segments(10*log10(seq(1,10,0.5)),1.2,10*log10(seq(1,10,0.5)),1.6,lwd=2,col="blue")
13 segments(10*log10(seq(1,2,0.2)),1.35,10*log10(seq(1,2,0.2)),1.45,lwd=1,col="blue")
14 segments(10*log10(seq(1,2,0.02)),1.37,10*log10(seq(1,2,0.02)),1.43,lwd=1,col="blue")
15 text(2,2.5,"Logarithmic spacing:")
16 Exmpls = c(1.13, 1.65,3.8,7.1,9.6)
17 segments(10*log10(Exmpls),0.5,10*log10(Exmpls),1.3,lwd=1,col="red")
18 text(10*log10(Exmpls),0.3,as.character(Exmpls))
19 ```
20
21 We can insert an image from a file like this:
22
23
24 !["Mannheim"-style K&E Slide Rule, Model 4058W.](Beginner0.jpg)
```

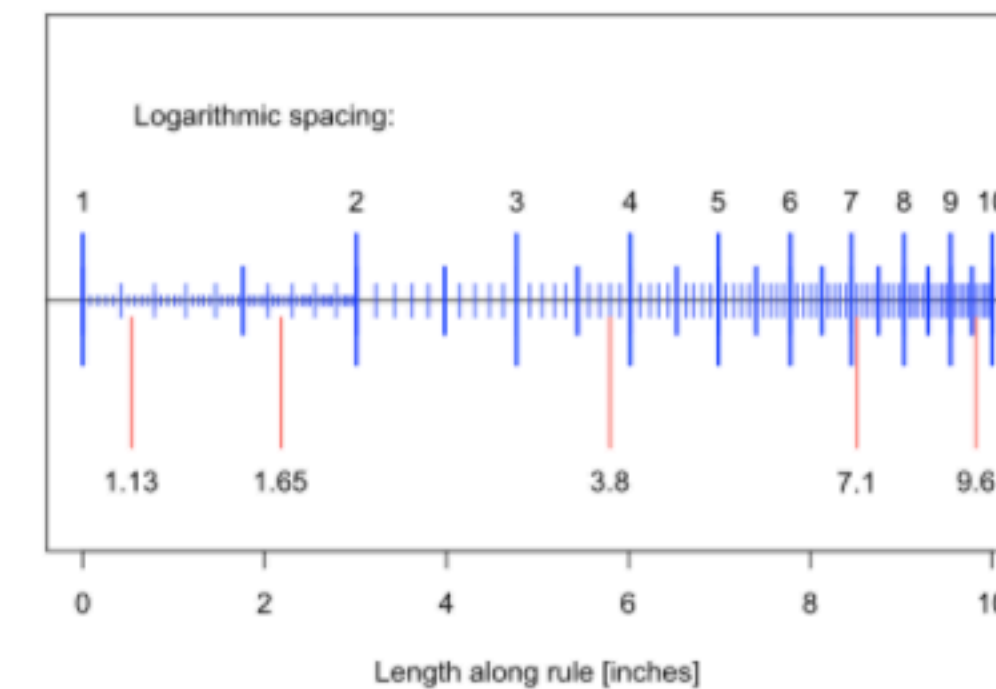


## 2 Example Text with Code

Here is an example of a code chunk that creates a Log Scale.

```
plot(0,0,ty="n",xlim=c(0,10),ylim=c(0,3),xlab="Length along rule [inches]",ylab="",yaxt="n",
     main="Making a Log Scale")
text(10*log10(c(1:10)),c(1:10)*0+2,c(1:10))
abline(h=1.4)
segments(10*log10(c(1:10)),1,10*log10(c(1:10)),1.8,lwd=2,col="blue")
segments(10*log10(seq(1,10,0.1)),1.3,10*log10(seq(1,10,0.1)),1.5,lwd=1,col="blue")
segments(10*log10(seq(1,10,0.5)),1.2,10*log10(seq(1,10,0.5)),1.6,lwd=2,col="blue")
segments(10*log10(seq(1,2,0.2)),1.35,10*log10(seq(1,2,0.2)),1.45,lwd=1,col="blue")
segments(10*log10(seq(1,2,0.02)),1.37,10*log10(seq(1,2,0.02)),1.43,lwd=1,col="blue")
text(2,2.5,"Logarithmic spacing:")
Exmpls = c(1.13, 1.65,3.8,7.1,9.6)
segments(10*log10(Exmpls),0.5,10*log10(Exmpls),1.3,lwd=1,col="red")
text(10*log10(Exmpls),0.3,as.character(Exmpls))
```

Making a Log Scale



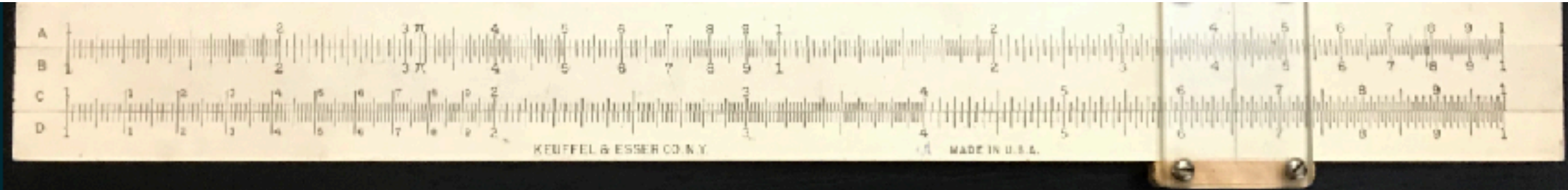
We can insert an image from a file like this:



Mannheim-style K&E Slide Rule, Model 4058W.



# A Bookdown Example



```
25  
26 We can also compute numbers and insert the results directly into the text. For example, suppose we  
want to initiate values for variables $x$ and $y$, and then compute and display within the text the  
result:
```

```
27  
28 $$  
29 z = \sqrt{x^2 + y^2}.  
30 $$
```

$$z = \sqrt{x^2 + y^2}.$$

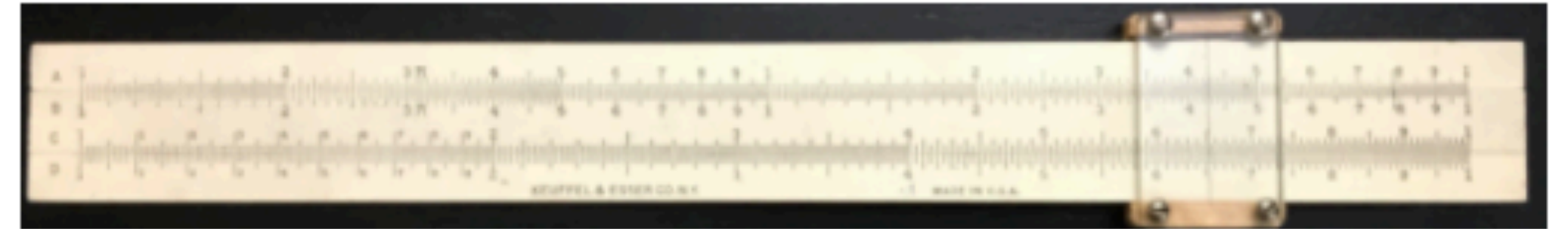
```
31 (Note that the equation and its display is written in standard $$\LaTeX$ format.)
```

```
32  
33 ```{r}  
34 x = 55  
35 y = 148  
36 z = sqrt(x^2 + y^2)  
37 ```
```

```
38  
39 The final result for the variable $z$ has a value of `r round(z,2)`, rounded to two decimal places,  
which you see is directly embedded and appropriately displayed in the final text.
```

```
40  
41  
42
```

We can insert an image from a file like this:



**Mannheim-style K&E Slide Rule, Model 4058W.**

We can also compute numbers and insert the results directly into the text. For example, suppose we want to initiate values for variables `x` and `y`, and then compute and display within the text the result:

$$z = \sqrt{x^2 + y^2}.$$

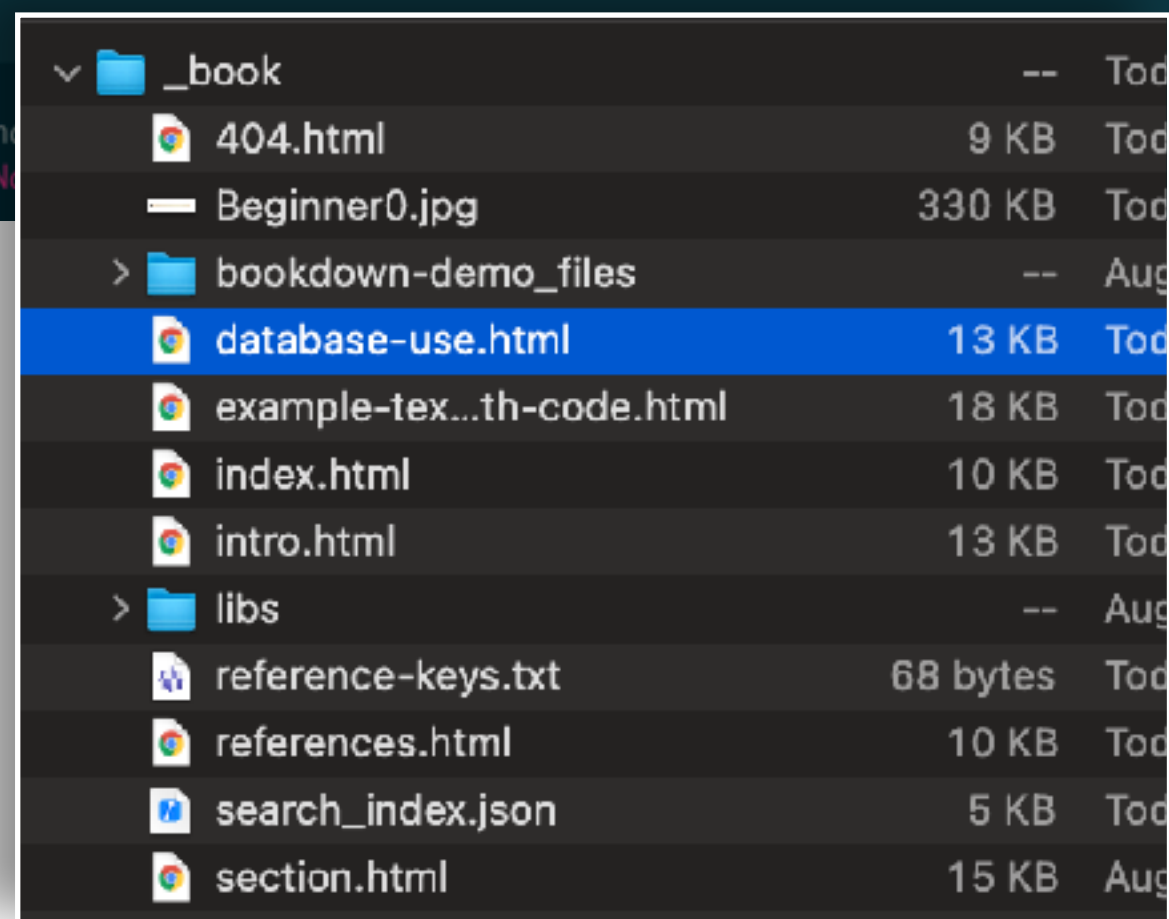
(Note that the equation and its display is written in standard `LaTeX` format.)

```
x = 55  
y = 148  
z = sqrt(x^2 + y^2)
```

The final result for the variable `z` has a value of `round(z,2)`, rounded to two decimal places, which you see is directly embedded and appropriately displayed in the final text.

# A Bookdown Example

```
1 # Database Use
2
3 We can read in a file from our directory and hence input data into a dataframe within R.
4
5 {r}
6 df = read.csv(file="datafile.csv")
7 {r}
8
9 Let's look at what we got:
10 {r}
11 head(df) # displays only the first few rows, if the file is large
12 {r}
13
14 Let's define a new column, 'z', where  $z = \sqrt{x^2 + y^2}$  for each row of our data:
15 {r}
16 df$z = sqrt(df$x^2 + df$y^2)
17 head(df)
18 {r}
19
20 We can now sort and display various members of our dataframe:
21
22 {r}
23 nrow(df) # count number of rows in the dataframe
24 ncol(df) # count number of columns in the dataframe
25
26 df[df$x>10,]
27 df[df$z<60,]
28 df[df$x>10 & df$z<60,]
29 {r}
30
31 From our dataframe which has 3 individual line entries, the only line which has  $x > 10$  as well as  $z < 60$  is the one with Name = Second.
```



## 3 Database Use

We can read in a file from our directory and hence input data into a `dataframe` within R.

```
df = read.csv(file="datafile.csv")
```

Let's look at what we got:

```
head(df) # displays only the first few rows, if the file is large
```

```
##   Name  x  y  p  q Rhat
## 1 First  3  5  1  6   7
## 2 Second 12 53 34 65  65
## 3 Third 143 643 376 762 191
```

Let's define a new column, `z`, where  $z = \sqrt{x^2 + y^2}$  for each row of our data:

```
df$z = sqrt(df$x^2 + df$y^2)
head(df)
```

```
##   Name  x  y  p  q Rhat      z
## 1 First  3  5  1  6   7  5.830952
## 2 Second 12 53 34 65  65  54.341513
## 3 Third 143 643 376 762 191 658.709344
```

We can now sort and display various members of our `dataframe`:

```
nrow(df) # count number of rows in the dataframe
```

```
## [1] 3
```

```
ncol(df) # count number of columns in the dataframe
```

```
## [1] 7
```

```
df[df$x>10,]
```

```
##   Name  x  y  p  q Rhat      z
## 2 Second 12 53 34 65  65  54.34151
## 3 Third 143 643 376 762 191 658.70934
```

```
df[df$z<60,]
```

```
##   Name  x  y  p  q Rhat      z
## 1 First  3  5  1  6   7  5.830952
## 2 Second 12 53 34 65  65  54.341513
```

```
df[df$x>10 & df$z<60,]
```

```
##   Name  x  y  p  q Rhat      z
## 2 Second 12 53 34 65  65  54.34151
```

From our `dataframe` which has 3 individual line entries, the only line which has  $x > 10$  as well as  $z < 60$  is the one with **Name = Second**.



# Making the Web Site

- Once all the files are edited and you're *ready to go*, then go to the *Build* tab and hit the **Build Book** button to generate all of the html pages

- The Build Book button will essentially re-build the entire web site, from beginning to end. There are options for doing only portions of the site, but this certainly gets the whole job done


The screenshot displays the RStudio interface with a project named 'aBookExample'. The left pane shows the R Markdown source code for 'index.Rmd', which includes metadata like title, author, and date, followed by a description and a code chunk for installing the 'bookdown' package. The right pane shows the rendered HTML output, which is a web page titled 'A Bookdown Example for a Web Site' by Mike Syphers, dated 2021-08-21. The 'Build' button in the bottom right corner of the RStudio window is highlighted with a red circle, and the 'Build Book' option in the dropdown menu is also highlighted with a red circle.

# Using the Bookdown Package

- Behind the scenes of FollowingTheRules.info ...

```
index.Rmd x
64
65 {r dataRead, echo=FALSE, warning=FALSE}
66 #filename="../database/SlideRuleDataTesting.csv"
67 filename="../database/SlideRuleDataWorking.csv"
68 df0 = fread(filename)
69 df = df0
70 df$ModelLnk = ifelse( is.na(df$imFile)==TRUE, df$Model,
71   paste0("[", df$Model, "](/images/", df$imFile, ") {target='_blank'}" )
72
73
74 {r subsetData, echo=FALSE}
75 KnE = df[Maker=="K&E"]
76 Pcktt = df[Maker=="Pickett"]
77 Concise = df[Maker=="Concise"]
78 Roos = df[Maker=="Charvoz-Roos"]
79 SunHemm = df[Maker=="Hemmi" &
80   !grepl("Post", Notes, fixed = TRUE) &
81   !grepl("US Blue", Notes, fixed = TRUE) &
82   !grepl("Hughes", Notes, fixed = TRUE) ]
83 SunPost = df[Maker=="Hemmi" & grepl("Post", Notes, fixed = TRUE)]
84 SunHughes = df[Maker=="Hemmi" & grepl("Hughes", Notes, fixed = TRUE)]
85 SunUSBlue = df[Maker=="Hemmi" & grepl("US Blue", Notes, fixed = TRUE)]
86 SunNoPost = df[Maker=="Hemmi" & (grepl("Hughes", Notes, fixed = TRUE)
87   | grepl("US Blue", Notes, fixed = TRUE) )]
88 Aristo = df[Maker=="Aristo"]
89 Dietz = df[Maker=="Dietzgen"]
90 GilsonRichardson = df[Maker=="Gilson" | Maker=="Richardson"]
91 Faber = df[Maker=="Faber" | Maker=="Faber-Castell"]
92 Nestler = df[Maker=="Nestler"]
```

```
_bookdown.yml x
1 book_filename: "SlideRuleCollection"
2 delete_merged_file: true
3 rmd_files: [
4 "index.Rmd",
5 "Introduction.Rmd",
6 "../Rev/ReviewLog.Rmd",
7 "../Rev/ReviewLogCalc.Rmd",
8 "../Rev/ReviewRules.Rmd",
9 "../Mkr/Makers_Start.Rmd", #-----
10 "../Mkr/Aristo.Rmd",
11 "../Mkr/Roos.Rmd",
12 "../Mkr/Concise.Rmd",
13 "../Mkr/Dietzgen.Rmd",
14 "../Mkr/Faber.Rmd",
15 "../Mkr/GilsonRichardson.Rmd",
16 "../Mkr/Hemmi.Rmd",
17 "../Mkr/KnE.Rmd",
18 "../Mkr/Lawrence.Rmd",
19 "../Mkr/Nestler.Rmd",
20 "../Mkr/Pickett.Rmd",
21 "../Mkr/RelayRicoh.Rmd",
22 "../Mkr/Sterling.Rmd",
23 "../Mkr/Thornton.Rmd",
24
```






# Using the Bookdown Package

- Behind the scenes of [FollowingTheRules.info](#) ...

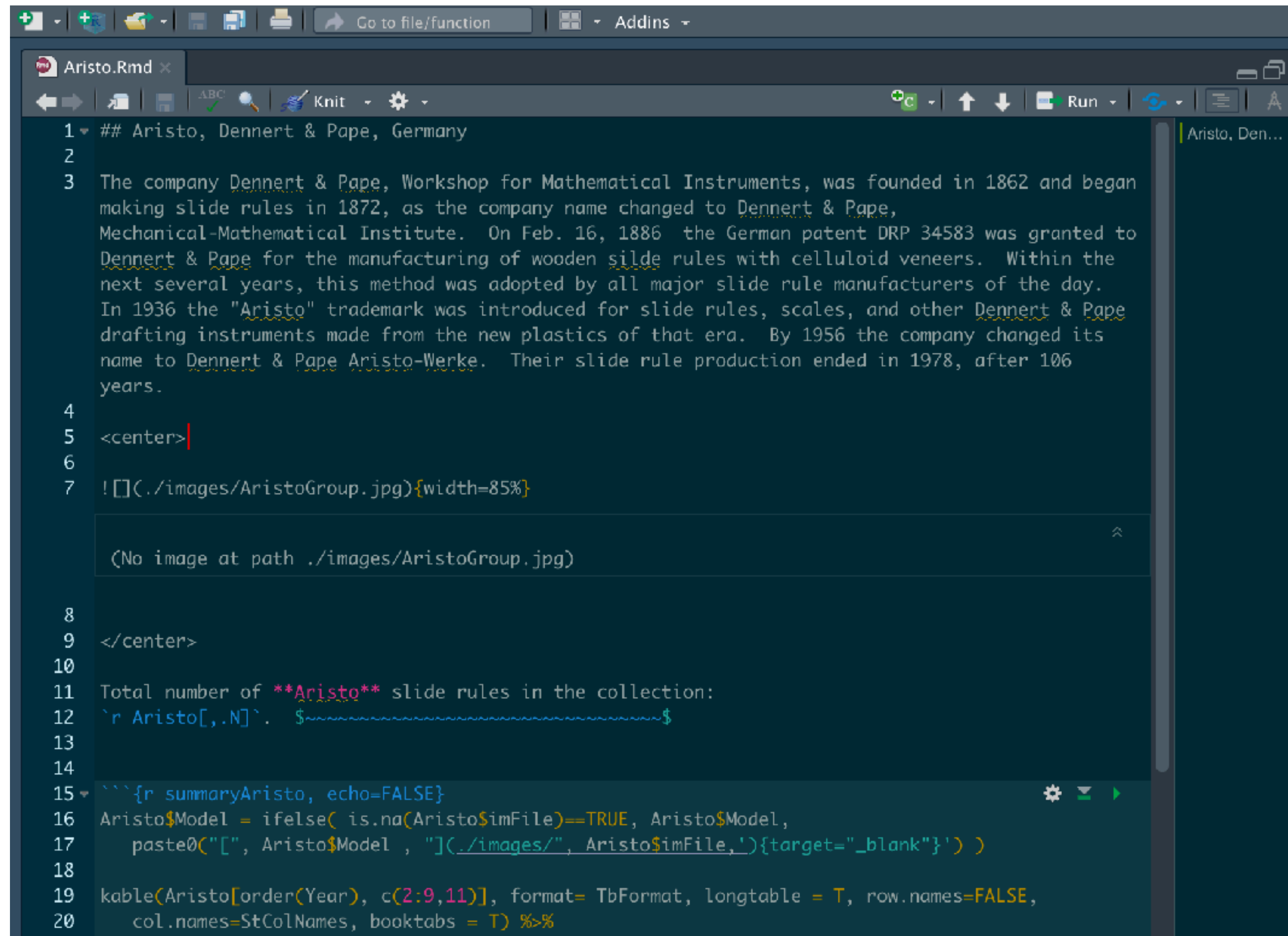
```
ReviewLogCalc.Rmd x
← → ↻ 🔍 Knit ⚙️
1 # Computing Logarithms
2
3 In the last chapter we gave examples of how one could fill in a curve of the form
4  $x=b^p$  in a laborious iterative fashion and, by inverting the result, one could in
5 principle obtain the exponent  $p$  (the logarithm) that corresponded to a given  $x$ 
6 for that particular base. Rather than taking such an iterative approach and "filling
7 in" tables of numbers [It is estimated that Napier spent 20 years developing his
8 first complete table of logarithms! And the connection between Napier's approach and
9 an "exponential" approach would not be made for yet another 20 years after that.], we
10 would rather be able to generate a formula for a logarithm of any given number (and,
11 in fact, for any chosen base) and be able to compute it to any desired accuracy.
12
13 In what follows we will use calculus to find a natural base to use for our
14 computations. With our appropriate definition of a natural logarithm we can use a
15 standard technique to find a Taylor Series in terms of the argument  $x$  to create a
16 formula for computing the natural logarithm of  $x$  using our natural base. Then, by
17 using one of our general rules of logarithms, we can find the common (Base 10)
18 logarithm of the number  $x$  to any reasonably desired accuracy.
19
20
21 ## The Natural Logarithm
22
23 If we make plots of  $b^x$  for various values of  $b$  we can see that the curves all
24 look very similar in nature:
25
26 ```{r, echo=FALSE, eval=FALSE}
27 x = seq(0,3,0.01)
28 plot(x,3^x,typ="l",ylab="",main=expression(paste("Plots of" ~ b^x)))
29 points(x,2.5^x,typ="l",lty=2)
30 points(x,2^x,typ="l",lty=2)
```

```
_bookdown.yml x
← → ↻ 🔍
1 book_filename: "SlideRuleCollection"
2 delete_merged_file: true
3 rmd_files: [
4 "index.Rmd",
5 "Introduction.Rmd",
6 "./Rev/ReviewLog.Rmd",
7 "./Rev/ReviewLogCalc.Rmd",
8 "./Rev/ReviewRules.Rmd",
9 "./Mkr/Makers_Start.Rmd", #-----
10 "./Mkr/Aristo.Rmd",
11 "./Mkr/Roos.Rmd",
12 "./Mkr/Concise.Rmd",
13 "./Mkr/Dietzgen.Rmd",
14 "./Mkr/Faber.Rmd",
15 "./Mkr/GilsonRichardson.Rmd",
16 "./Mkr/Hemmi.Rmd",
17 "./Mkr/KnE.Rmd",
18 "./Mkr/Lawrence.Rmd",
19 "./Mkr/Nestler.Rmd",
20 "./Mkr/Pickett.Rmd",
21 "./Mkr/RelayRicoh.Rmd",
22 "./Mkr/Sterling.Rmd",
23 "./Mkr/Thornton.Rmd",
24
```

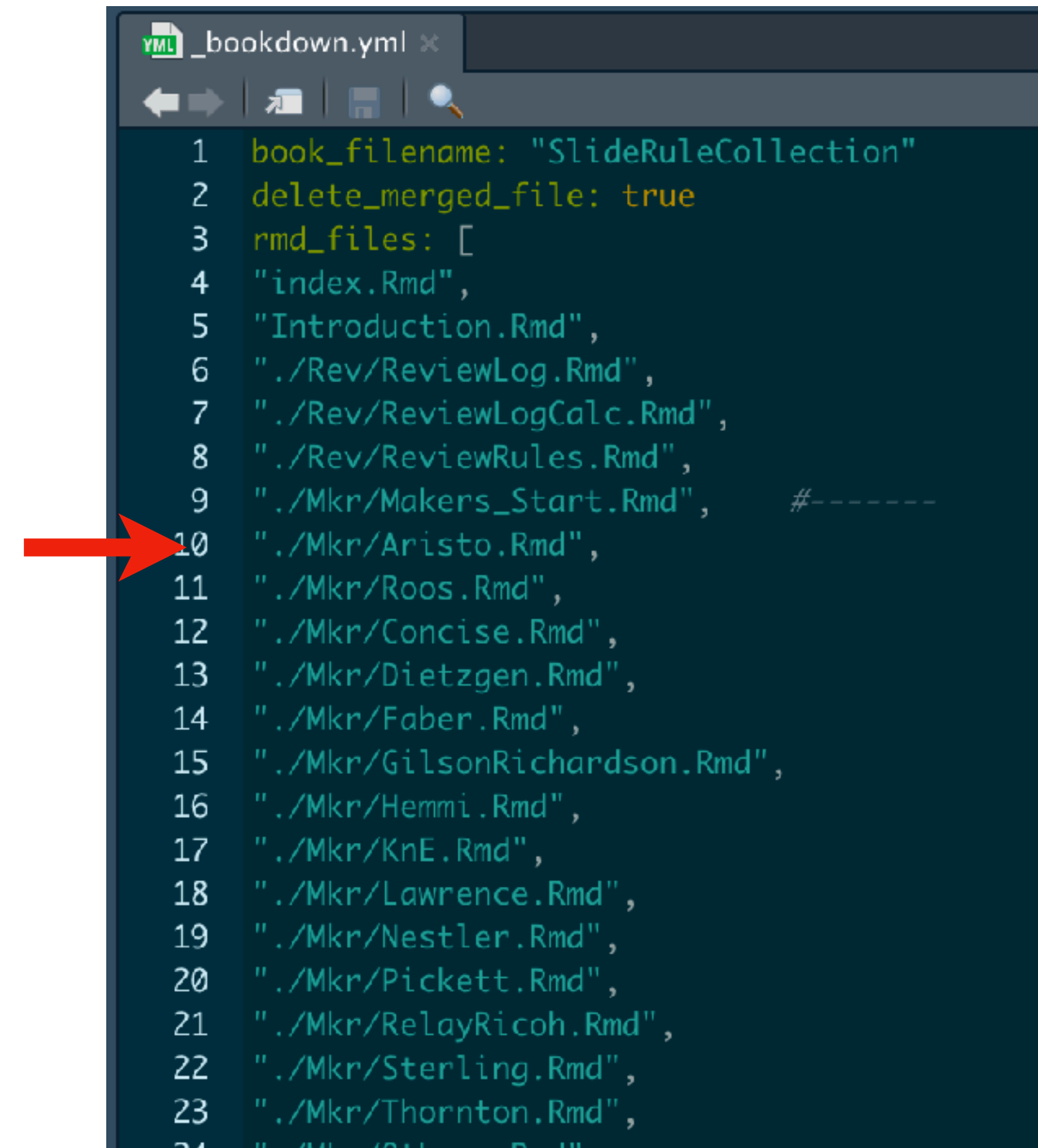


# Using the Bookdown Package

- Behind the scenes of [FollowingTheRules.info](#) ...



```
1 ## Aristo, Dennert & Pape, Germany
2
3 The company Dennert & Pape, Workshop for Mathematical Instruments, was founded in 1862 and began
  making slide rules in 1872, as the company name changed to Dennert & Pape,
  Mechanical-Mathematical Institute. On Feb. 16, 1886 the German patent DRP 34583 was granted to
  Dennert & Pape for the manufacturing of wooden slide rules with celluloid veneers. Within the
  next several years, this method was adopted by all major slide rule manufacturers of the day.
  In 1936 the "Aristo" trademark was introduced for slide rules, scales, and other Dennert & Pape
  drafting instruments made from the new plastics of that era. By 1956 the company changed its
  name to Dennert & Pape Aristo-Werke. Their slide rule production ended in 1978, after 106
  years.
4
5 <center>
6
7 {width=85%}
8
9 </center>
10
11 Total number of Aristo slide rules in the collection:
12 `r Aristo[,.N]`. $~~~~~$
13
14
15 ```{r summaryAristo, echo=FALSE}
16 Aristo$Model = ifelse( is.na(Aristo$SimFile)==TRUE, Aristo$Model,
17   paste0("[", Aristo$Model, "](./images/", Aristo$SimFile,')){target="_blank"}') )
18
19 kable(Aristo[order(Year), c(2:9,11)], format= TbFormat, longtable = T, row.names=FALSE,
20   col.names=StColNames, booktabs = T) %>%
```



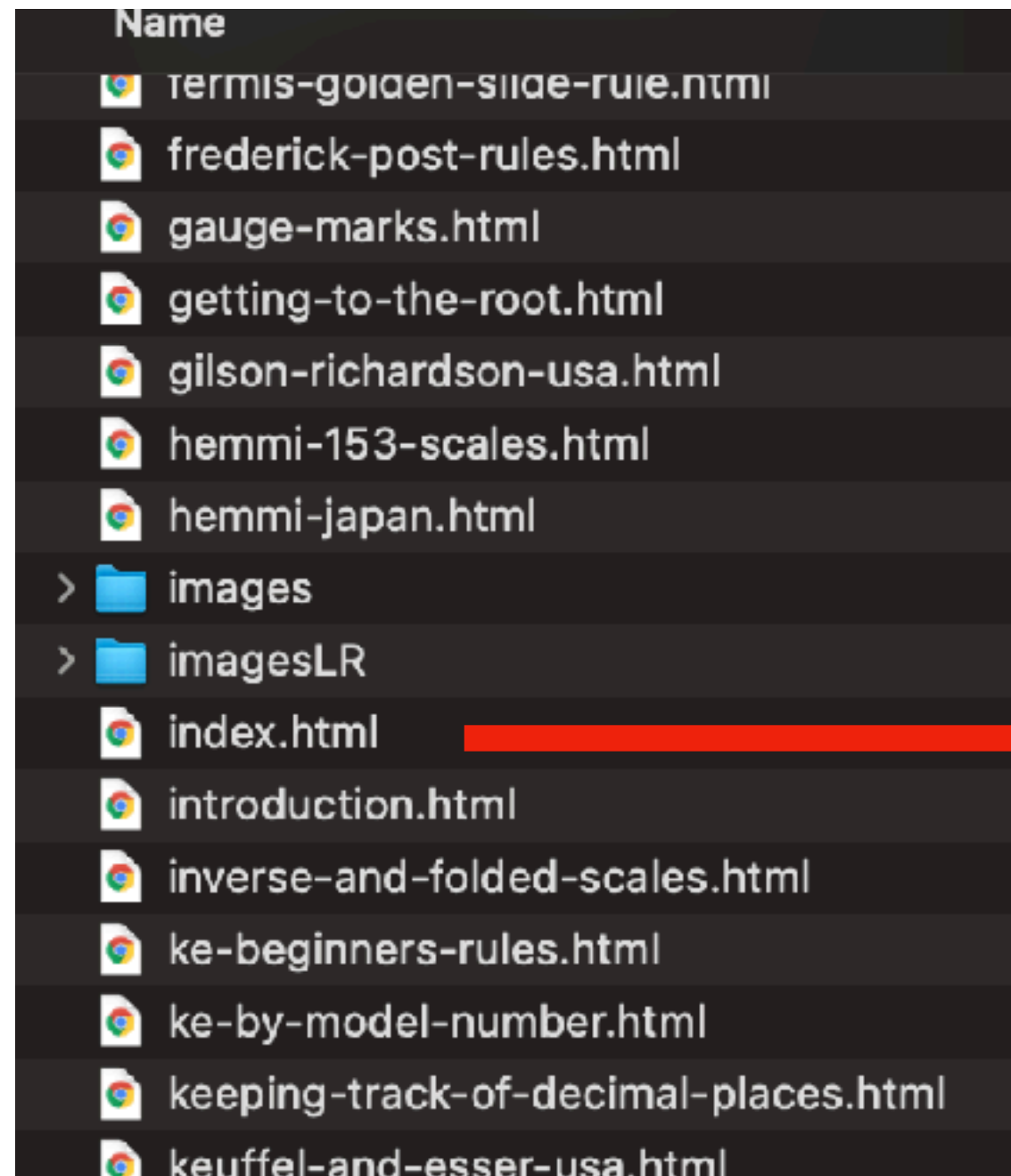
```
1 book_filename: "SlideRuleCollection"
2 delete_merged_file: true
3 rmd_files: [
4 "index.Rmd",
5 "Introduction.Rmd",
6 "../Rev/ReviewLog.Rmd",
7 "../Rev/ReviewLogCalc.Rmd",
8 "../Rev/ReviewRules.Rmd",
9 "../Mkr/Makers_Start.Rmd", #-----
10 "../Mkr/Aristo.Rmd",
11 "../Mkr/Roos.Rmd",
12 "../Mkr/Concise.Rmd",
13 "../Mkr/Dietzgen.Rmd",
14 "../Mkr/Faber.Rmd",
15 "../Mkr/GilsonRichardson.Rmd",
16 "../Mkr/Hemmi.Rmd",
17 "../Mkr/KnE.Rmd",
18 "../Mkr/Lawrence.Rmd",
19 "../Mkr/Nestler.Rmd",
20 "../Mkr/Pickett.Rmd",
21 "../Mkr/RelayRicoh.Rmd",
22 "../Mkr/Sterling.Rmd",
23 "../Mkr/Thornton.Rmd",
24
```



# The Final Result

<http://followingtherules.info>

within the folder *\_book* :



Following the Rules

Introduction

- 1 Review of the Logarithm
- 2 Computing Logarithms
- 3 Slide Rule ABC's and D's

Collection Overview

- 4 The Slide Rule Collection
- 5 The Collection in Photos
- 6 Collection Scale Sets
- 7 Special Groupings
- 8 Books, Manuals, and Sheets
- 9 Vignettes

Appendices

- Short Slide Rule History
- Common Slide Rule Scales
- Some Collection Statistics
- References for Individual Rules
- Data Frame Properties
- Site Tips
- About this Web Site
- About the Author

References

Published with bookdown

## Following the Rules – A Slide Rule Collection

*New to slide rules? Let's get started !*

<i>New Rules</i>	<i>Vignettes</i>	<i>Site Tips</i>
	<i>Latest Vignette:</i>	K&E Beginner's Rules
<b>Collection Overview</b>	Rule Makers	Collection Photos
Logarithm Review	Slide Rule Basics	Slide Rule Scales
		References

Welcome! This database-driven web site presents a personal collection of slide rules as well as other useful information about slide rules in general, their operation and use. Click the "right arrow" > on this web page or hit the right arrow key on the keyboard to go to the next page. Or, use the left navigation pane to go directly to a particular chapter or subject.

*-Mike Syphers*

About This Web Site	About the Author
---------------------	------------------

The Oughtred Society	14 August 2021	International Slide Rule Museum
----------------------	----------------	---------------------------------

# Site Updates

- I just got a new slide rule! What do I do now?
  - create a new database entry (single line) into the *database.csv* file
  - photograph the slide rule and create *NewSlideRule.jpg* file
    - put image into the */images* folder
  - *re-build* the R project, then post/synch resulting html files/folders onto server
    - all tables, figures, sums, etc. within the text will be automatically updated
- next: do a little research, perhaps? is it *vignette*-worthy?

# Regular Maintenance

- Constantly looking over the site
  - typos, inconsistencies, photo improvements, ideas for new material
  - sometimes re-order the material (but has been constant for a while now)
- Always looking for feedback and suggestions. Please contact me!

[syphersm@gmail.com](mailto:syphersm@gmail.com)