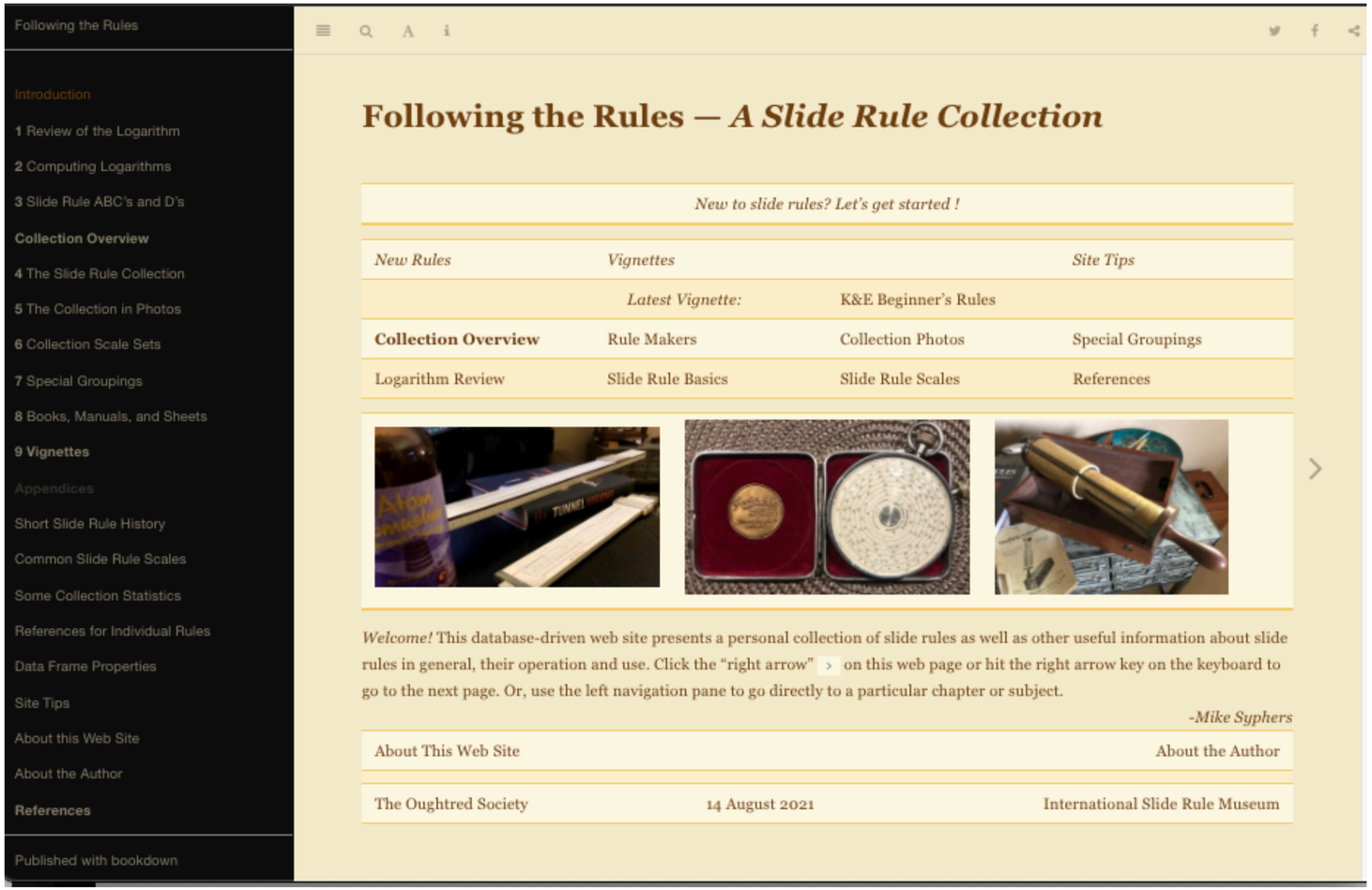
Maintaining A Slide Rule Web Site

- Mike Syphers
  - http://followingtherules.info



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	http://www.mccoys-kecatalogs.com/KECatalogs/1901/1901kecata294.htm , http://www.mccoys-kecatalogs.com/Dating.htm#Specials
Keuffel & Esser	4053-3	1910-1914	"374*"	no	good condition; no cursor; prod. marks "374*" on end of rule	http://www.sliderule.ca/4053-.htm; http://www.mccoys-kecatalogs.com/v24_2_p56-61.pdf; http://sliderulemuseum.com/SR_Dates.htm#KE
Keuffel & Esser	4088-3	1913-1914	"55"	box	good condition, box too; prod. marks "55" on end of rule	http://www.mccoys-kecatalogs.com/KECollection/4088/ke4088-3_s
Keuffel & Esser	4041	1915-1921	"207"	box	Rule in good condition; prod. mark "207" on end of rule	http://www.mccoys-kecatalogs.com/KECollection/4041/ke4041fa
Keuffel & Esser	4058	1915-1925		no	"Student's Rule"; nice condition	http://www.mccoys-kecatalogs.com/KEModels/ke4058family.htm
Keuffel & Esser	4088-3	1916-1922	"324"	box	Rule in good condition; prod. mark "324" on end of rule	http://www.mccoys-kecatalogs.com/Dating.htm, http://www.mc
Keuffel & Esser	4058	1916-1922		no	good condition; very early 4058	http://www.mccoys-kecatalogs.com/KECollection/4058/ke4058fa
Keuffel & Esser	4088-3	1923	35516	no	good condition	http://sphere.bc.ca/test/ke/320-kie_date2.jpg, http://www.gl
Keuffel & Esser	4092-3	1923	64405	yes	good condition; serif type; Doc McClain; stitched case	http://sphere.bc.ca/test/ke/320-kie_date2.jpg, http://www.gl
Keuffel & Esser	N4053-3	1925	140188	yes	stitched case; C.H. Drake, O.S.C.	http://sliderulemuseum.com/Manuals/KE_Date.jpg
Keuffel & Esser	4092-3	1927	277653	yes	stitched case; missing flap	http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3
Keuffel & Esser	4092-3S	1928	295472	yes	stitched case; R.W. Bluhm	http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3
Keuffel & Esser	4092-3S	1931	441408	yes	stitched case; J.A.S.	http://www.mccoys-kecatalogs.com/KECollection/4092-3/ke4092-3
Keuffel & Esser	4058W	1930-34		box	Beginner's Rule; wood cursor frame	http://www.mccoys-kecatalogs.com/KECollection/4058/ke4058fa
Keuffel & Esser	N4053-5	1934	633813	yes	20" slide rule; very nice condition	http://www.mccoys-kecatalogs.com/Dating.htm
Keuffel & Esser	4058W	1936-43		box	Beginner's Rule	http://www.mccoys-kecatalogs.com/KECollection/4058/ke4058fa
Keuffel & Esser	N4041	1938	833535	box	rule, box in nice condition	http://www.mccoys-kecatalogs.com/KEModels/ke4041family.htm
Keuffel & Esser	4054	1945	219646	yes	nice box; broken cursor block	http://sliderulemuseum.com/KE_Standard.htm
Keuffel & Esser	4055	1949	568414	yes		http://sliderulemuseum.com/KE_Standard.htm
Keuffel & Esser	4081-3	1949	589003	yes	very worn-out case; "U. Illinois" engraved, as well as "Gates"	http://www.mccoys-kecatalogs.com/KECollection/4081-3/ke4081-3
Keuffel & Esser	4090-3	1951	763828	yes	dotted leather case; Nelson rec	http://www.mccoys-kecatalogs.com/KECollection/4090-3/ke4090fa

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

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

Slide Rule Collection

Mike Sythers

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

1

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

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

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

~/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/sl
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; Denn
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,"radia
11 Boykin,RotaRule Model 510,,1965,,S,pl,50,yes,800,"Original box, case,
```

SlideRuleDataWorking.csv

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
C-Thru	S-96	c.	1973		C	pl	15	no	1

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?

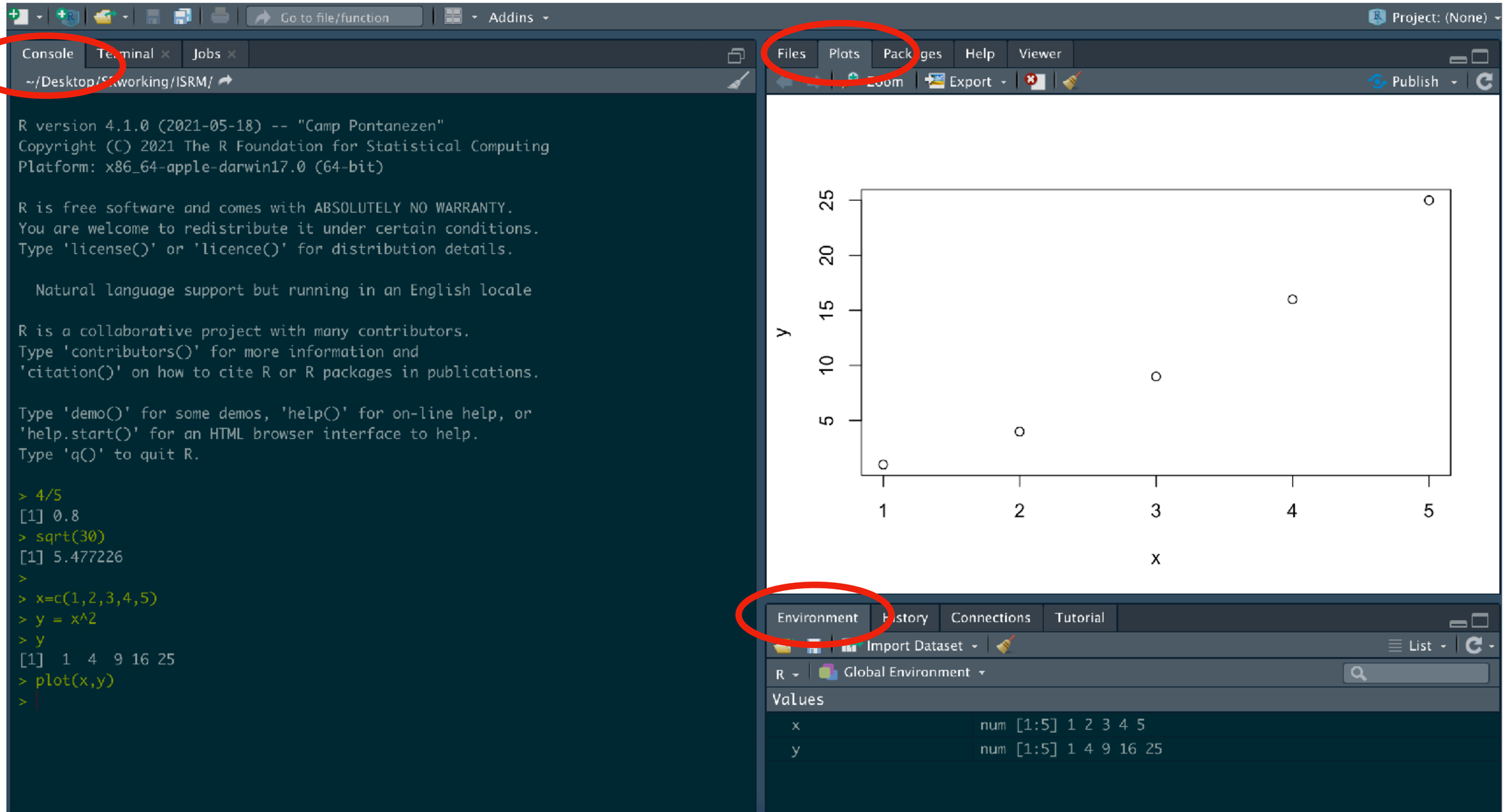
- Sort by Maker? by Year? by Type? Size? Scales?

How About ALL OF THE ABOVE?

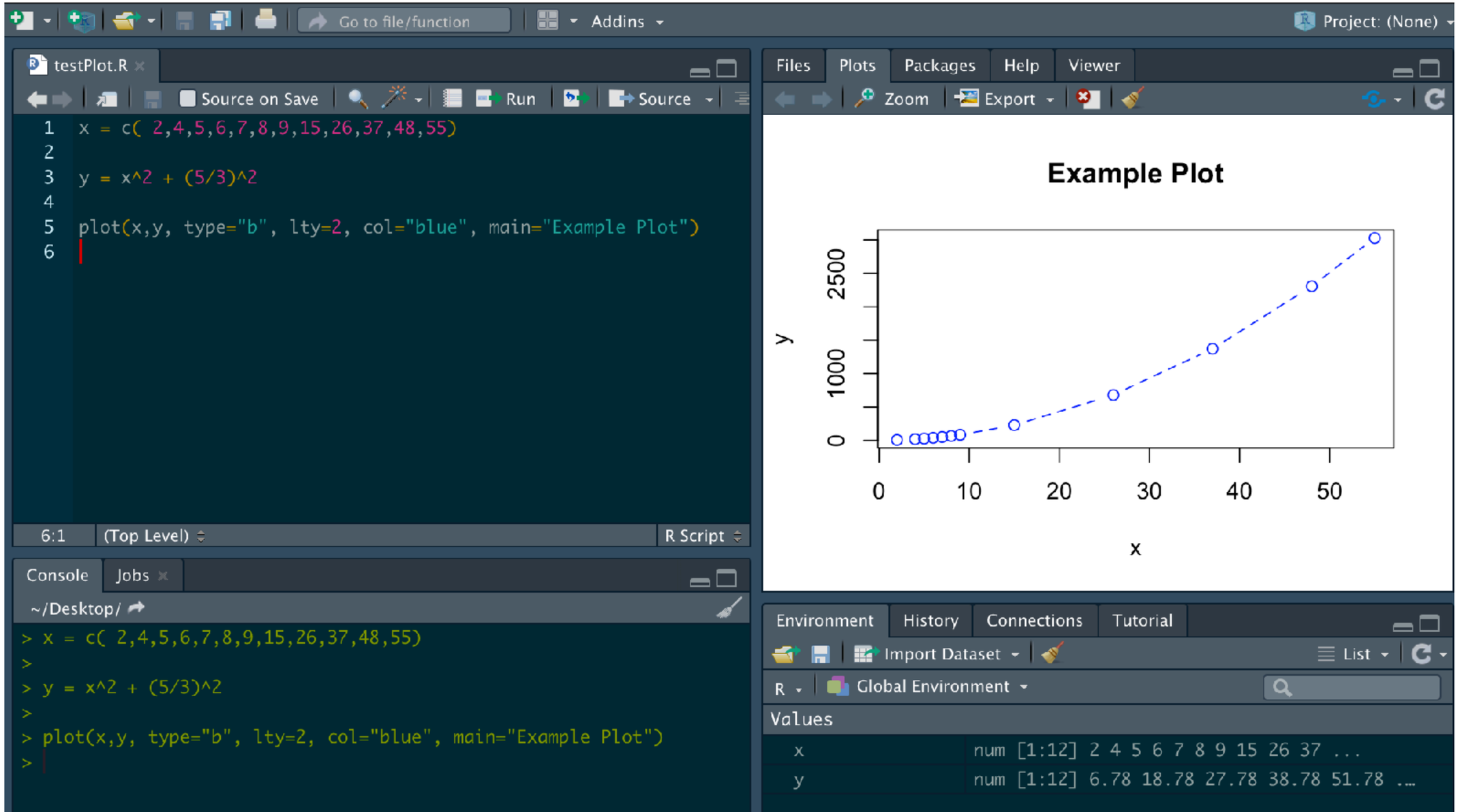
Enter: R and RStudio

- 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



An R Program (using RStudio)



An Rmarkdown Document

RmdExample.Rmd

```
---
title: "Document using R Markdown"
author: "MJ Syphers"
date: "August 2021"
output: html_document
---

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>.

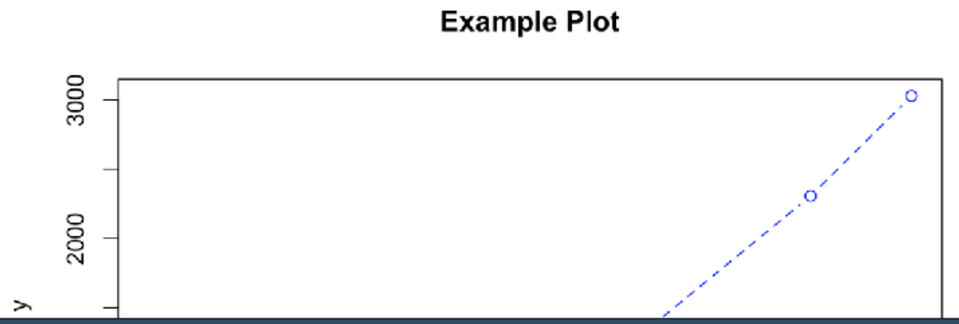
When you click the **Knit** button a document will be generated that
includes both content as well as the output of any embedded R code
chunks within the document. You can embed an R code chunk like this:

```{r}
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")
```

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.
```

17:60 Chunk 1 R Markdown

Console R Markdown Jobs

~/Desktop/SRworking/ISRM/

```
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

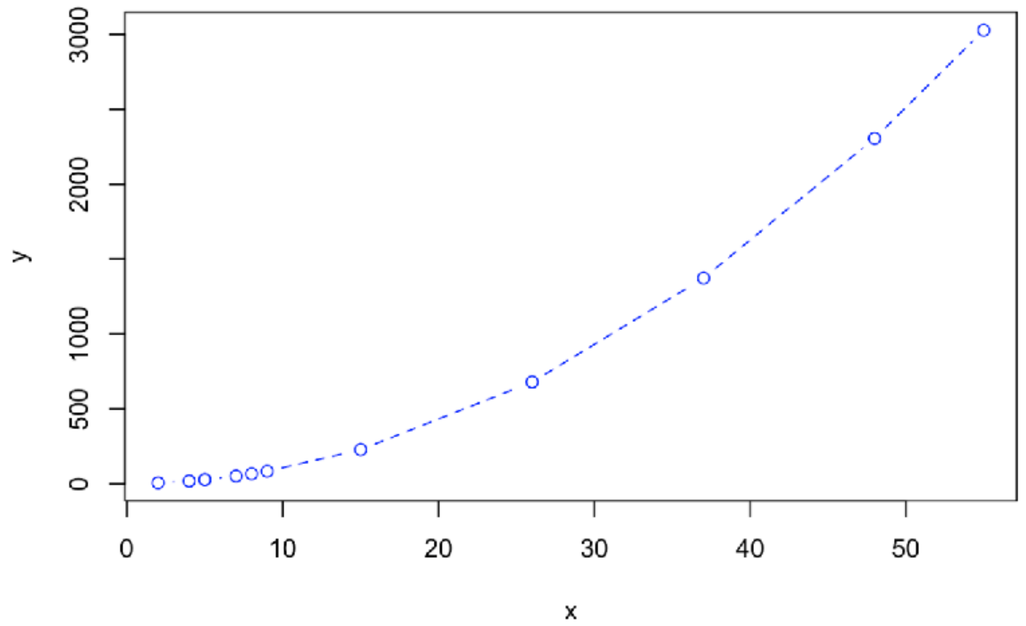
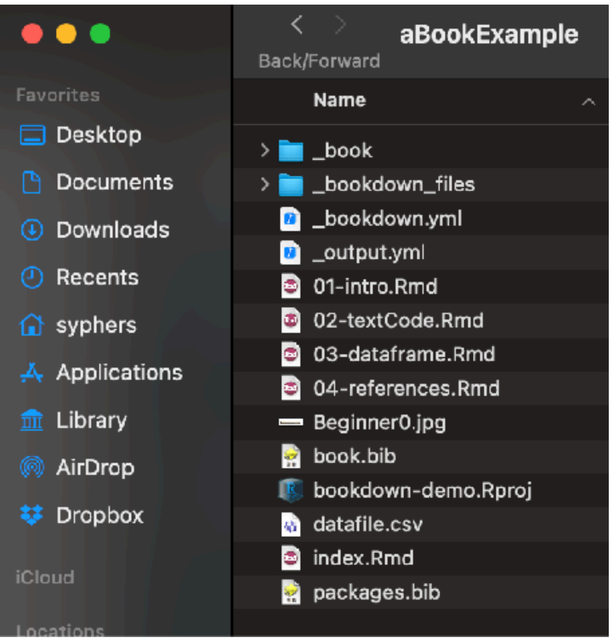
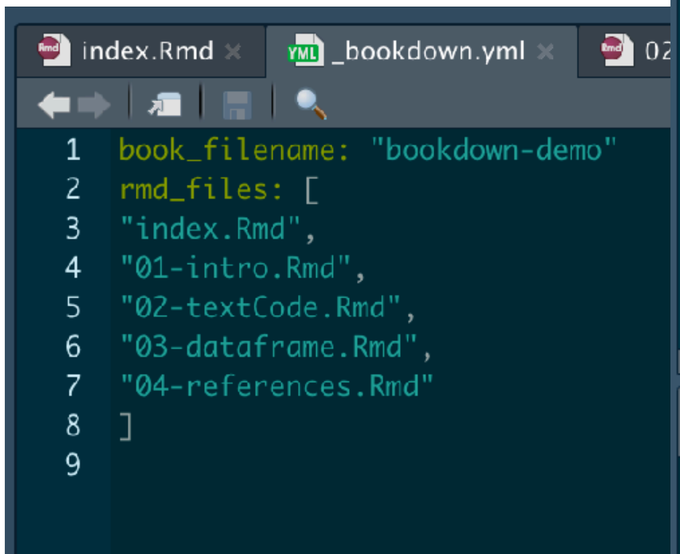
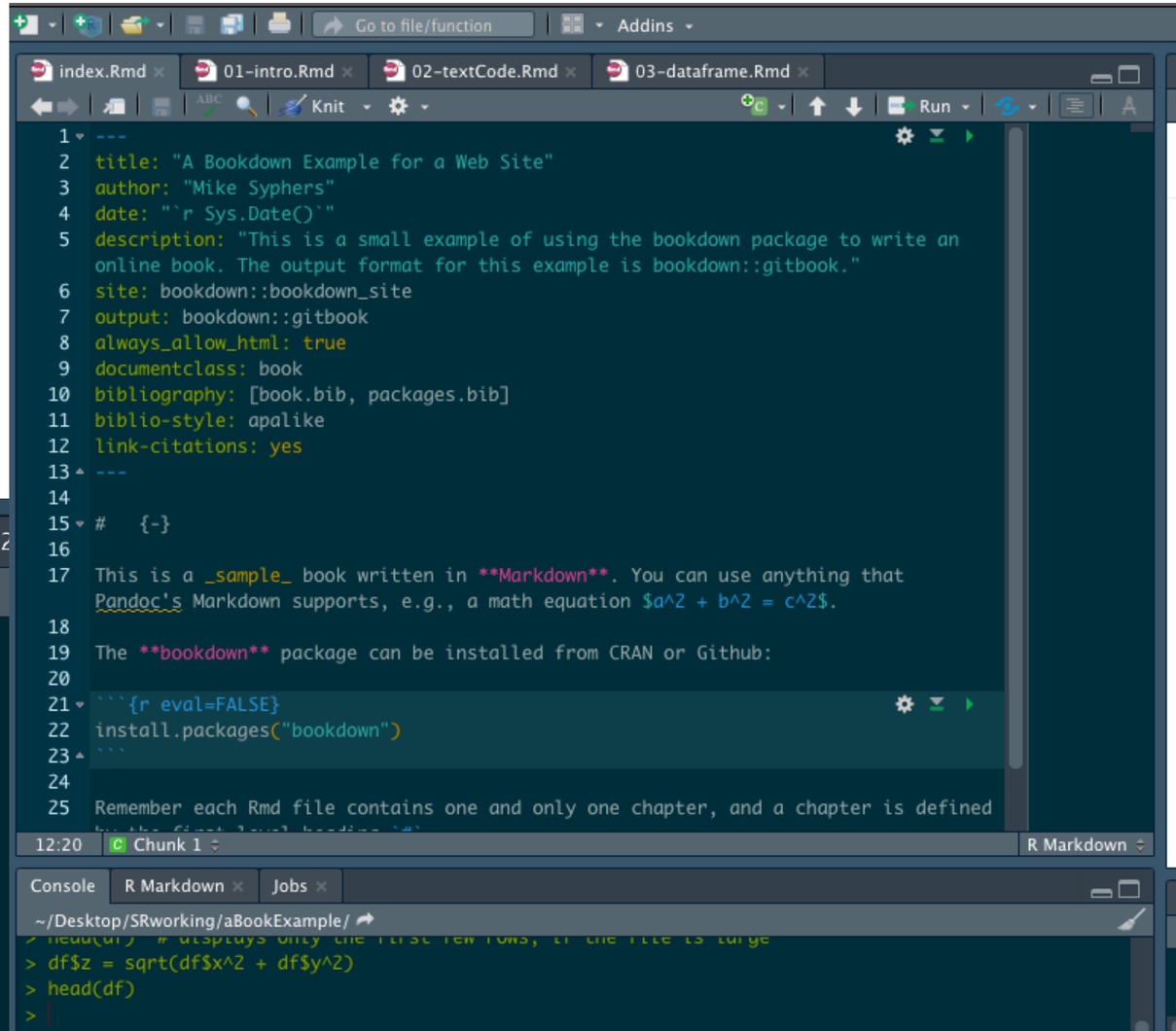
>
```

Files Plots Packages Help Viewer

Publish

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")
```



Environment History Connections Tutorial

An Rmarkdown Document

RmdExample.Rmd

```
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.

```{r, echo=FALSE}
a = 22.5   # semi-major axis
b = 12.67  # semi-minor axis

Aell = pi*a*b  # Area of the ellipse
```

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 `r a` and `r b` respectively, is A_{ell} = `r
round(Aell,2)`.
```

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



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, *pan*s) a *doc*ument 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 in *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 Bookdown Example

index.Rmd | 01-intro.Rmd | 02-textCode.Rmd | 03-dataframe.Rmd

```
# Introduction {#intro}

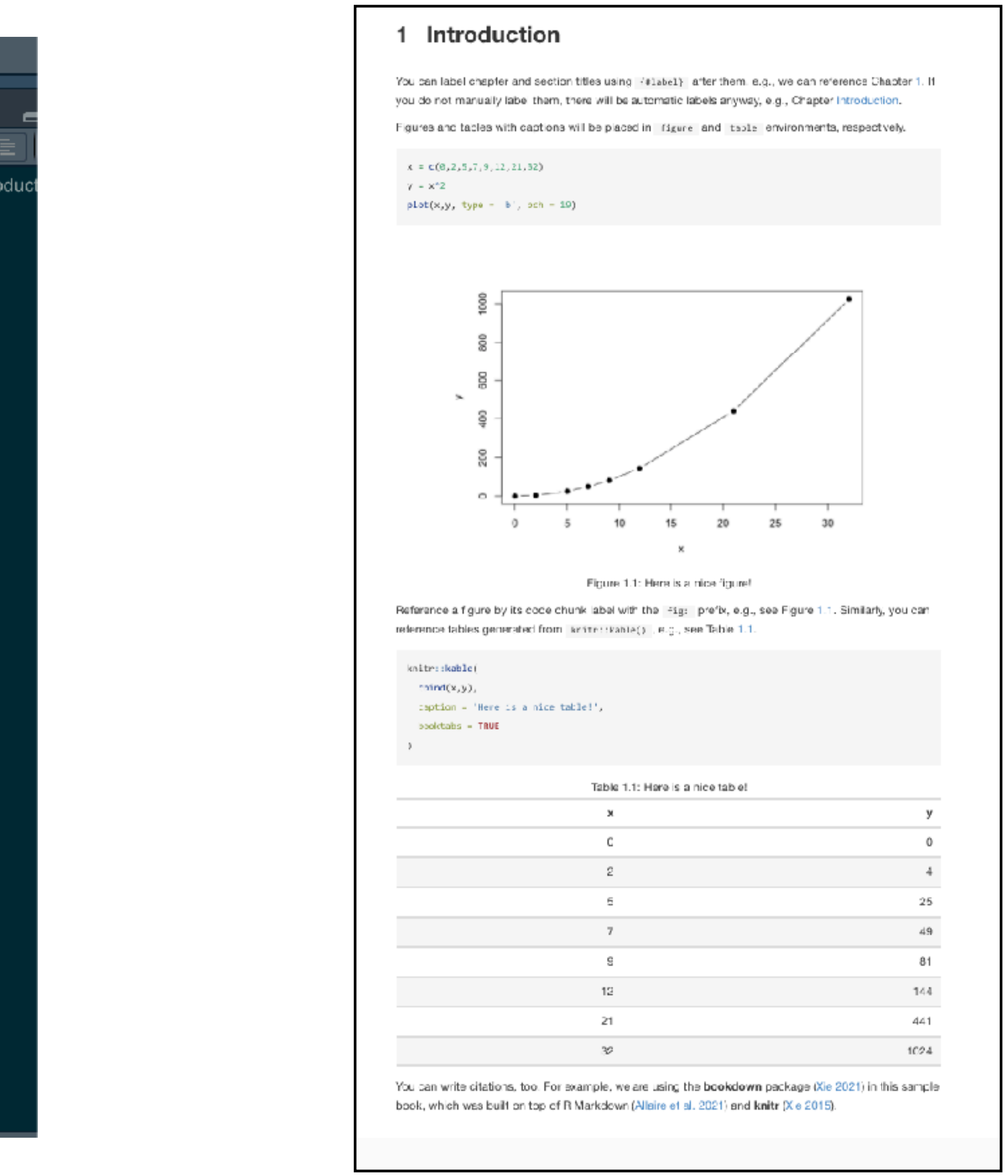
You can label chapter and section titles using `{#label}` after them, e.g., we can reference
Chapter \@ref(intro). If you do not manually label them, there will be automatic labels anyway,
e.g., Chapter [Introduction].

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

```{r nice-fig, fig.cap='Here is a nice figure!', out.width='80%', fig.asp=.75,
fig.align='center'}
x = c(0,2,5,7,9,12,21,32)
y = x^2
plot(x,y, type = 'b', pch = 19)
```

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).

```{r nice-tab, tidy=FALSE}
knitr::kable(
  cbind(x,y),
  caption = 'Here is a nice table!',
  booktabs = TRUE
)
```

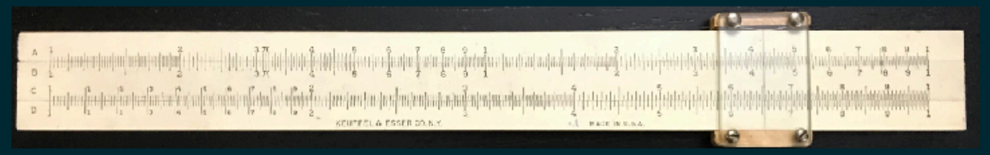
You can write citations, too. For example, we are using the **bookdown** package [@R-bookdown] in
this sample book, which was built on top of R Markdown [@R-rmarkdown] and **knitr** [@xie2015].
```



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 (Allaire et al. 2021) and **knitr** (Xie 2015).

A Bookdown Example

index.Rmd | 01-intro.Rmd | 02-textCode.Rmd* | 03-dataframe.Rmd

Knit | Run

```
# Example Text with Code

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

```{r}
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))
```

We can insert an image from a file like this:

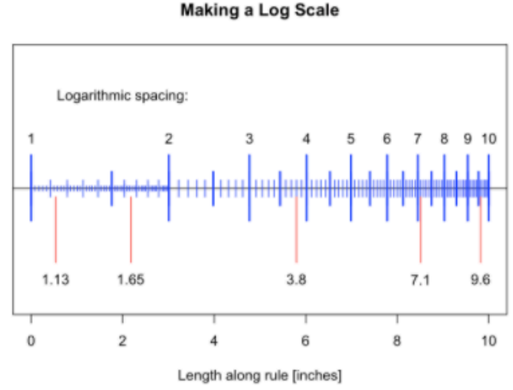
![**Mannheim**-style K&E Slide Rule, Model 4058W.](Beginner0.jpg)



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))
```



We can insert an image from a file like this:

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

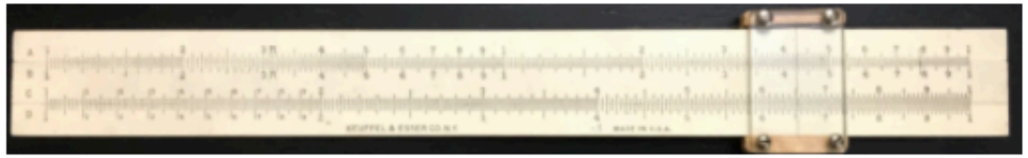
A Bookdown Example

```
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:

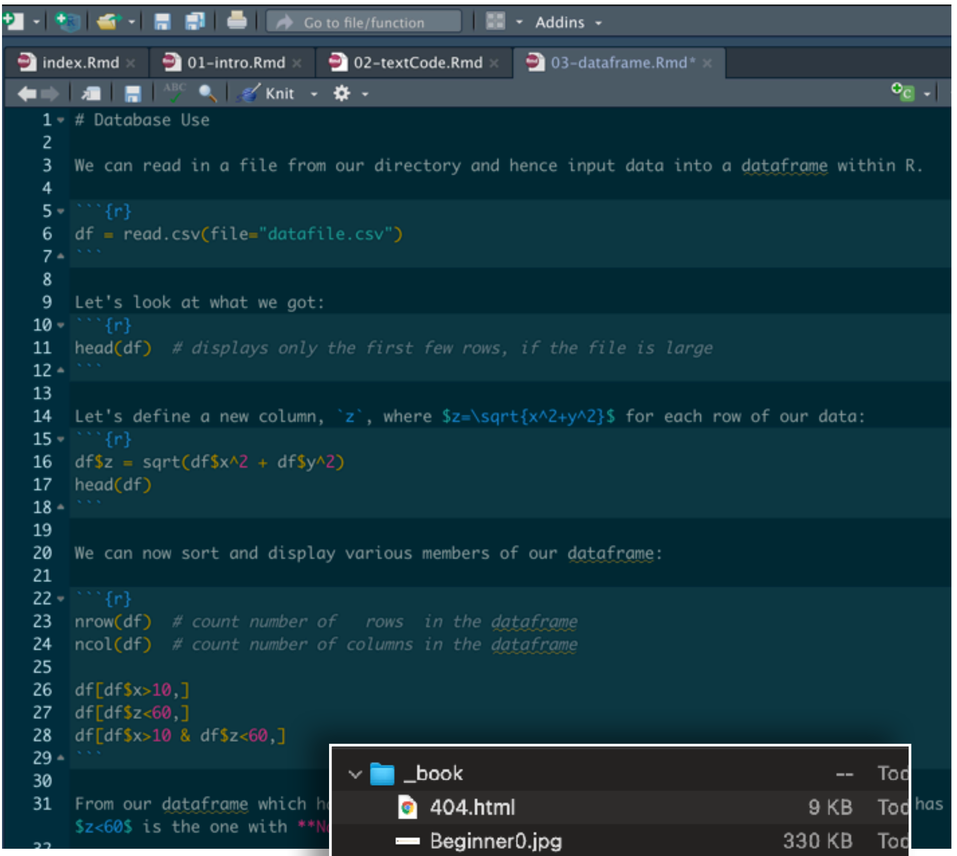
$$z = \sqrt{x^2 + y^2}.$$

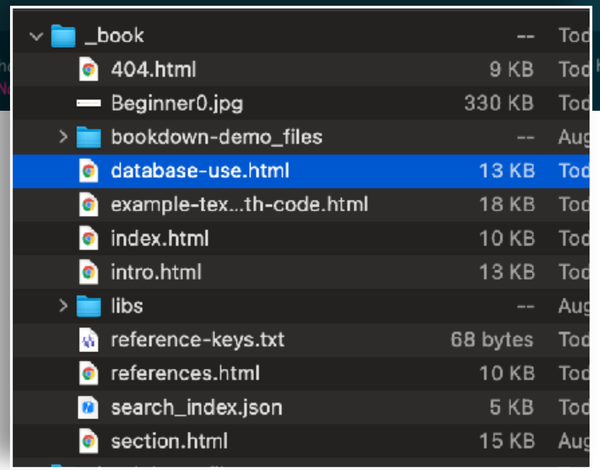
(Note that the equation and its display is written in standard $\LaTeX$ format.)

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

The final result for the variable z has a value of 157.89, rounded to two decimal places, which you see is directly embedded and appropriately displayed in the final text.

A Bookdown Example





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,]
```

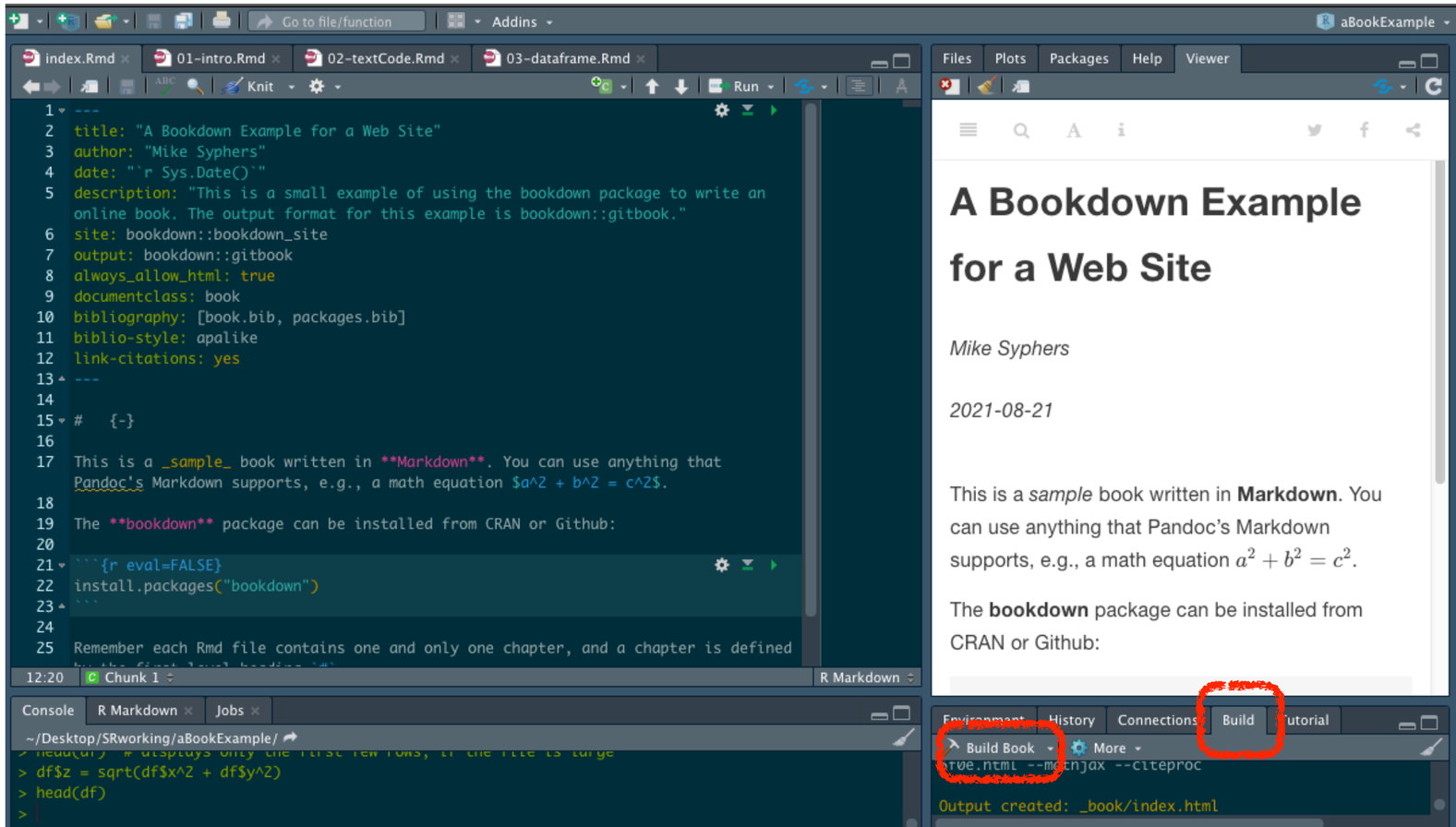
```
##     Name  x  y  p  q Rhat        z
## 2 Second 12 53 34 65   65 54.34151
```

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



Using the Bookdown Package

- Behind the scenes of FollowingTheRules.info …

index.Rmd

Knit Run

```
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

```
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",
```

Using the Bookdown Package

- Behind the scenes of FollowingTheRules.info …

ReviewLogCalc.Rmd

```
# Computing Logarithms

In the last chapter we gave examples of how one could fill in a curve of the form $x=b^p$ in a laborious iterative fashion and, by *inverting* the result, one could in principle obtain the exponent $p$ (the logarithm) that corresponded to a given $x$ for that particular base.  Rather than taking such an iterative approach and "filling in" tables of numbers^[It is estimated that Napier spent 20 years developing his first complete table of logarithms!  And the connection between Napier's approach and an "exponential" approach would not be made for yet another 20 years after that.], we would rather be able to generate a formula for a logarithm of any given number (and, in fact, for any chosen base) and be able to compute it to any desired accuracy.

In what follows we will use *calculus* to find a *natural* base to use for our computations.  With our appropriate definition of a natural logarithm we can use a standard technique to find a *Taylor Series* in terms of the argument $x$ to create a formula for computing the natural logarithm of $x$ using our natural base.  Then, by using one of our general rules of logarithms, we can find the *common* (Base 10) logarithm of the number $x$ to any reasonably desired accuracy.


## The Natural Logarithm

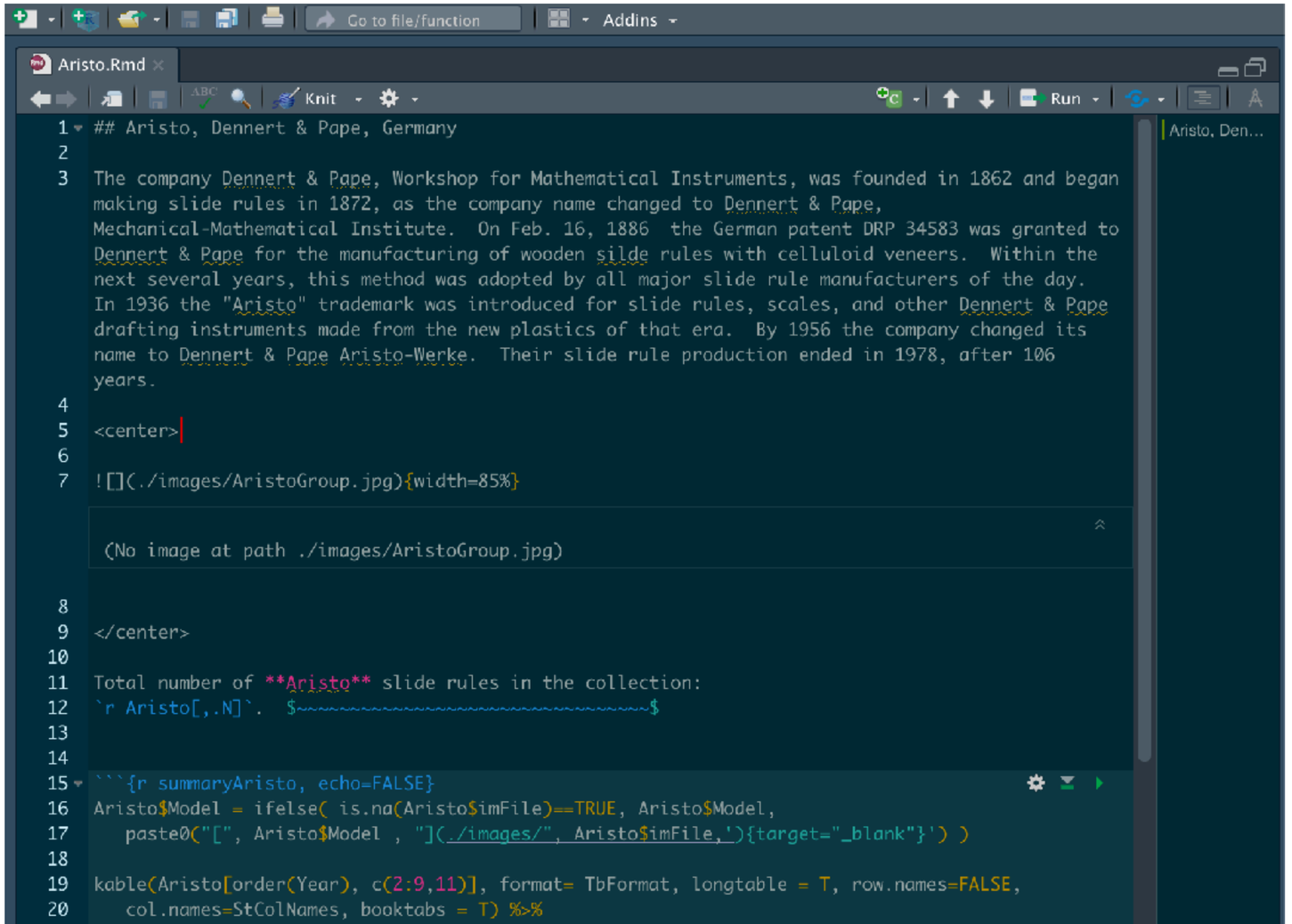
If we make plots of $b^x$ for various values of $b$ we can see that the curves all look very similar in nature:
```{r, echo=FALSE, eval=FALSE}
x = seq(0,3,0.01)
plot(x,3^x,typ="l",ylab="",main=expression(paste("Plots of" ~ b^x)))
points(x,2.5^x,typ="l",lty=2)
```

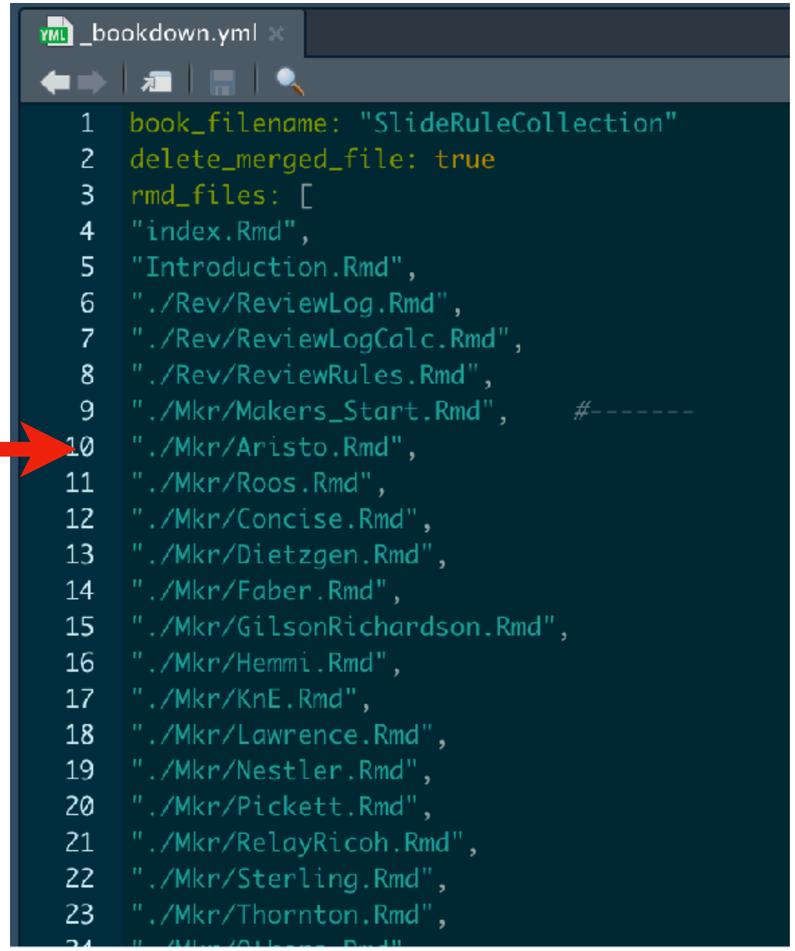
_bookdown.yml

```
book_filename: "SlideRuleCollection"
delete_merged_file: true
rmd_files: [
"index.Rmd",
"Introduction.Rmd",
"./Rev/ReviewLog.Rmd",
"./Rev/ReviewLogCalc.Rmd",
"./Rev/ReviewRules.Rmd",
"./Mkr/Makers_Start.Rmd",     #------
"./Mkr/Aristo.Rmd",
"./Mkr/Roos.Rmd",
"./Mkr/Concise.Rmd",
"./Mkr/Dietzgen.Rmd",
"./Mkr/Faber.Rmd",
"./Mkr/GilsonRichardson.Rmd",
"./Mkr/Hemmi.Rmd",
"./Mkr/KnE.Rmd",
"./Mkr/Lawrence.Rmd",
"./Mkr/Nestler.Rmd",
"./Mkr/Pickett.Rmd",
"./Mkr/RelayRicoh.Rmd",
"./Mkr/Sterling.Rmd",
"./Mkr/Thornton.Rmd",
```
```

Using the Bookdown Package

- Behind the scenes of FollowingTheRules.info …

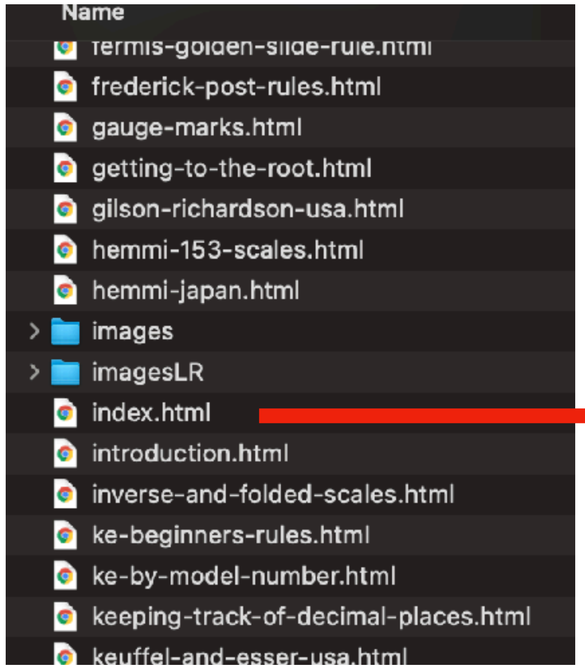


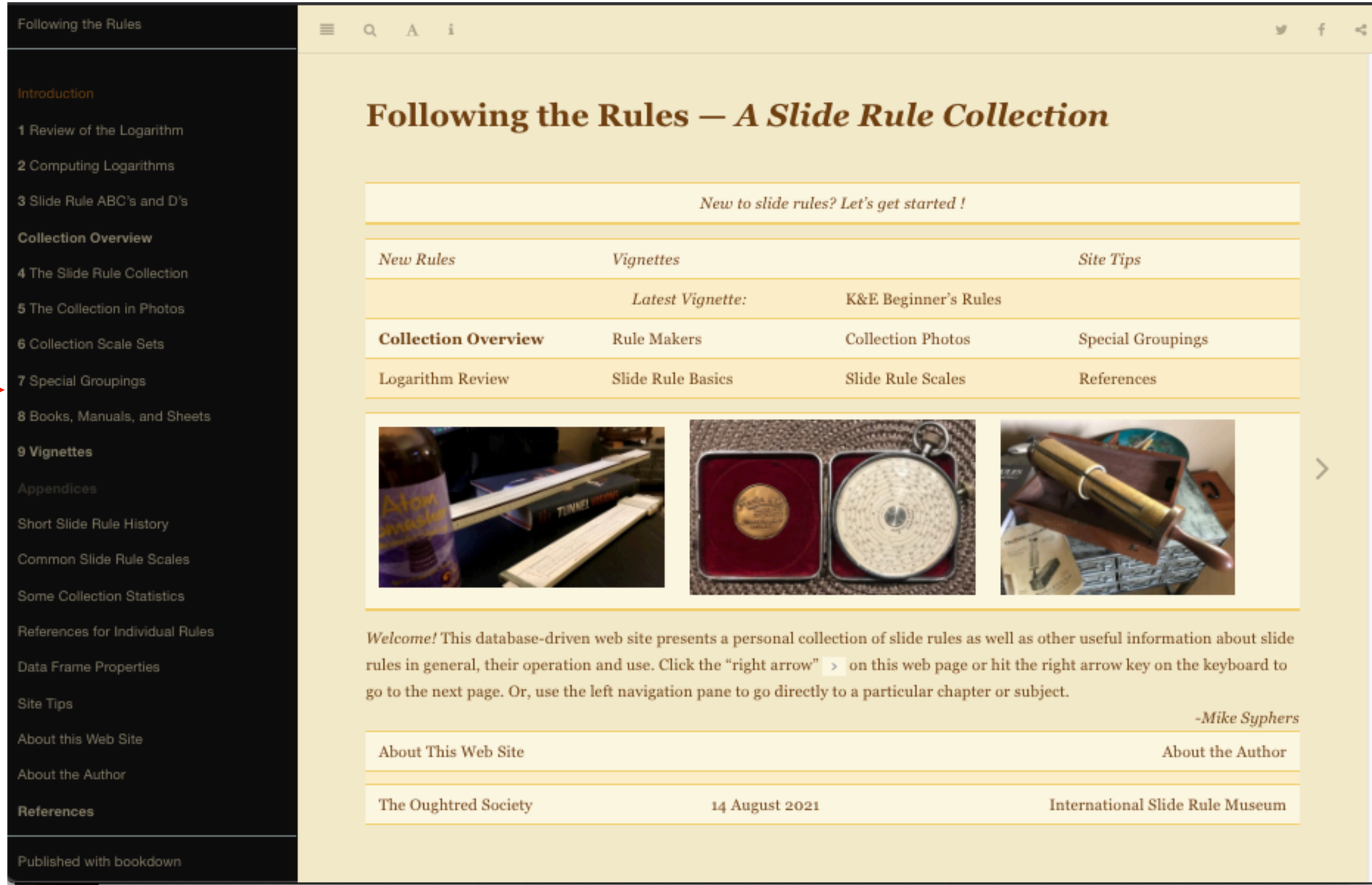


The Final Result

http://followingtherules.info

within the folder *_book* :





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