Welcome! Waiting for Workshop to start.

R for Economics Workshop Day 2: Friday Jan 14, **9am** - 4pm CT

Things to do while you wait:
- Start up RStudio following instructions on [u.tamu.edu/R4Econ](http://u.tamu.edu/R4Econ)
- Respond to poll “Are you having technical difficulties…?”
- If you need technical assistance, join the breakout room.
R for Economics

Wesley Brashear
14 January 2022
Day 2 - Friday, January 14th, 9:00-4:00

1. Starting RStudio
2. Warm-up Review
3. Matrices
4. Data Frames
5. Data visualization in R
6. User-created functions
7. Working with R markdown
Data Frames

Zhenhua He
14 January 2022
**DataFrame**

- Primary R data structure
- Two-dimensional size-mutable
- Heterogeneous tabular data structure

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>x</td>
<td>0.1</td>
<td>True</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>y</td>
<td>2.4</td>
<td>False</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>z</td>
<td>1.9</td>
<td>True</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>w</td>
<td>8.3</td>
<td>False</td>
</tr>
<tr>
<td>E</td>
<td>9</td>
<td>a</td>
<td>6.8</td>
<td>False</td>
</tr>
</tbody>
</table>

```
# DataFrame Example

**House sale data**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>date</td>
<td>price</td>
<td>bedrooms</td>
<td>bathrooms</td>
<td>sqft_living</td>
<td>sqft_lot</td>
<td>floors</td>
</tr>
<tr>
<td>7129300520</td>
<td>20141013T0C0</td>
<td>221900</td>
<td>3</td>
<td>1</td>
<td>1180</td>
<td>5650</td>
<td>1</td>
</tr>
<tr>
<td>6414100192</td>
<td>20141209T0C0</td>
<td>538000</td>
<td>3</td>
<td>2.25</td>
<td>2570</td>
<td>7242</td>
<td>2</td>
</tr>
<tr>
<td>5631500400</td>
<td>20150225T0C0</td>
<td>180000</td>
<td>2</td>
<td>1</td>
<td>770</td>
<td>10000</td>
<td>1</td>
</tr>
<tr>
<td>2487200875</td>
<td>20141209T0C0</td>
<td>604000</td>
<td>4</td>
<td>3</td>
<td>1960</td>
<td>5000</td>
<td>1</td>
</tr>
<tr>
<td>1954400510</td>
<td>20150218T0C0</td>
<td>510000</td>
<td>3</td>
<td>2</td>
<td>1680</td>
<td>8080</td>
<td>1</td>
</tr>
<tr>
<td>7237550310</td>
<td>20140512T0C0</td>
<td>1.23E+06</td>
<td>4</td>
<td>4.5</td>
<td>5420</td>
<td>101930</td>
<td>1</td>
</tr>
<tr>
<td>1321400060</td>
<td>20140627T0C0</td>
<td>257500</td>
<td>3</td>
<td>2.25</td>
<td>1715</td>
<td>6819</td>
<td>2</td>
</tr>
<tr>
<td>2008000270</td>
<td>20150115T0C0</td>
<td>291850</td>
<td>3</td>
<td>1.5</td>
<td>1060</td>
<td>9711</td>
<td>1</td>
</tr>
<tr>
<td>2414600126</td>
<td>20150415T0C0</td>
<td>229500</td>
<td>3</td>
<td>1</td>
<td>1780</td>
<td>7470</td>
<td>1</td>
</tr>
</tbody>
</table>
Creating a Data Frame

Ways to do so:
• from matrix
• from vectors
• Read file (read.csv, read.table, …)
Break until 1 PM CST
Working with R Markdown

Wesley Brashears
14 January 2022
R Markdown

- Allows users to create reports for data analyzed in R
- Connects data to report = reproducibility
- Supports a variety of outputs:
  - HTML
  - PDF
  - MS word
  - Shiny applications
- Can use multiple languages including R, Python, and SQL
First R Markdown

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown 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
summary(cars)
```

```
### speed  dist
### Min. : 4.0  Min. : 2.00
### 1st Qu.:12.0  1st Qu.: 26.00
### Median:15.0  Median: 36.00
### Mean:15.4  Mean : 42.98
### 3rd Qu.:19.0  3rd Qu.: 56.00
### Max. :25.0  Max. :128.00
```

Including Plots

You can also embed plots, for example:

```r
plot(cars$speed, cars$dist)
```
R Markdown

1. Click down arrow
2. Select R Markdown
1. Change the document name

2. Select to save as Word
R Markdown

YAML header:
- Generated automatically
- Opens and closes with ‘---’
- Includes title, output format, can also include author and date
This section is used to set up global options - can be overwritten in individual code chunk headers
R Markdown

This text will be included in the report.
R Markdown

First code chunk.
- Code chunk opens and closes with 3 backticks.
- Curly brackets include `r` (denoting the language) and the name of the code chunk
- `echo = TRUE` inherited from code chunk - code will be shown in report
This text will be included in the report.
R Markdown

---

title: "FirstMarkdown"
output: word_document
---

```{r setup, include=FALSE}
knitr::opts_chunkset(echo = TRUE)
```

## R Markdown

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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}
cars
summary(cars)
```

## Including Plots

You can also embed plots, for example:

```{r}
plot(pressure)
```

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

---

Second code chunk
- Creates a plot
- `echo = FALSE` - plot will be in report, but code will not
This icon allows you to run individual code chunks.
R Markdown

Output
- Allows you to check code before generating report

```
# R Markdown

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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
summary(cars)
```

```
speed  dist
Min.    4.0  2.00
1st Qu. 12.0 26.00
Median  15.0 50.00
Mean    15.4 42.98
3rd Qu. 19.0 66.00
Max.    25.0 120.00
```

# Including Plots

You can also embed plots, for example:

```r
plot(pressure)
```

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.
```
R Markdown

Inline code opens and closes with single backtick.
Click “Knit” to generate report
R Markdown

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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
summary(cars)
## speed     dist
## Min.   : 4.00 Min. : 2.00
## 1st Qu. :12.00 1st Qu.: 26.00
## Median :15.00 Median: 36.00
## Mean   :15.48 Mean  :42.98
## 3rd Qu.:19.00 3rd Qu.: 56.00
## Max.   :25.00  Max. :120.00
```

Including Plots

You can also embed plots, for example:

Note that the echo = FALSE parameter was added to the code chunk to prevent printing of the R code that generated the plot.
R Markdown Cheat Sheet:
R Markdown Cheat Sheet:


5. Embed Code

- **Inline code**
  - Surround code with backticks and `.r`
  - R replaces inline code with its results.

- **Code chunks**
  - Start a chunk with ````r`
  - End a chunk with `````
  - Two plus two equals four.

6. Render

- Use your `.rmd` file as a blueprint to build a finished report.

- **Render your report in one of two ways**
  1. Run `rmarkdown::render("file path")`
  2. Click the **knit HTML** button at the top of the RStudio scripts pane

When you render, R will:

- execute each embedded code chunk and insert the results into your report
- build a new version of your report in the output file type
- open a preview of the output file in the viewer pane
- save the output file in your working directory

7. Interactive Docs

- **Turn your report into an Interactive Shiny document in 3 steps**
  1. Add runtime shiny to the YAML header
  2. In the code chunks, add Shiny input functions to embed widgets.
  3. Add Shiny render functions to embed reactive output

- Render with `rmarkdown::render()` or `knit()` command

8. Publish

- **Share your report**
  - Through R Markdown publishing sites like [Rpubs.com](https://www.rpubs.com)
  - [ShinyApps.io](https://www.shinyapps.io)

9. Learn More

- Further information on [tidyverse](https://www.tidyverse.org), [shiny](https://shiny.rstudio.com), and [rmarkdown](https://rmarkdown.rstudio.com)

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Texas A&M University - High Performance Research Computing - R for Economics - Spring 2022
R for Economics Day 2 - Workshop Close

Thank you for attending the workshop!

Resources for the workshop are available at
https://hprc.tamu.edu/events/workshops/2022-01-11-REcon.html

For any questions please email help@hprc.tamu.edu with “R for Economics” in the subject line

For help with technical issues with R you can register for a “Bring Your Own Code” session here:
https://docs.google.com/forms/d/e/1FAIpQLSceBxSHiaPGd-oFWZ8d5024aWfBZyeGUy6RYposaYGpENpUsg/viewform?usp=sf_link
10 minute break