STOR 320 Workflow in RMarkdown

Lecture 3

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Workflow Information

- Chapters Discussing Workflow
  - Chapter 4: Basics
  - Chapter 6: Rscripts
  - Chapter 8: Projects
- Our Focus is on Workflow Within RMarkdown
- Today's Lecture on RMarkdown
  - Running R Code
  - Objects
  - Functions

Essential Reads

- Highly Advised Reading
  - Chapter 27: RMarkdown
    - Basics
    - Text Formatting
    - Code Chunks
  - Chapter 28: More ggplot Info
    - Labeling
    - Annotating
    - Scaling
    - Zooming
    - Themes
    - Saving Graphics

RStudio

Go to file/function | Addins

Untitled1

Knit | Insert | Run

```
---
title: "New R Markdown File"
author: "Yao Li"
date: "8/13/2020"
output: html_document
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

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 cars}
summary(cars)
```

Including Plots

You can also embed plots, for example:
```

23:1 | Including Plots | R Markdown

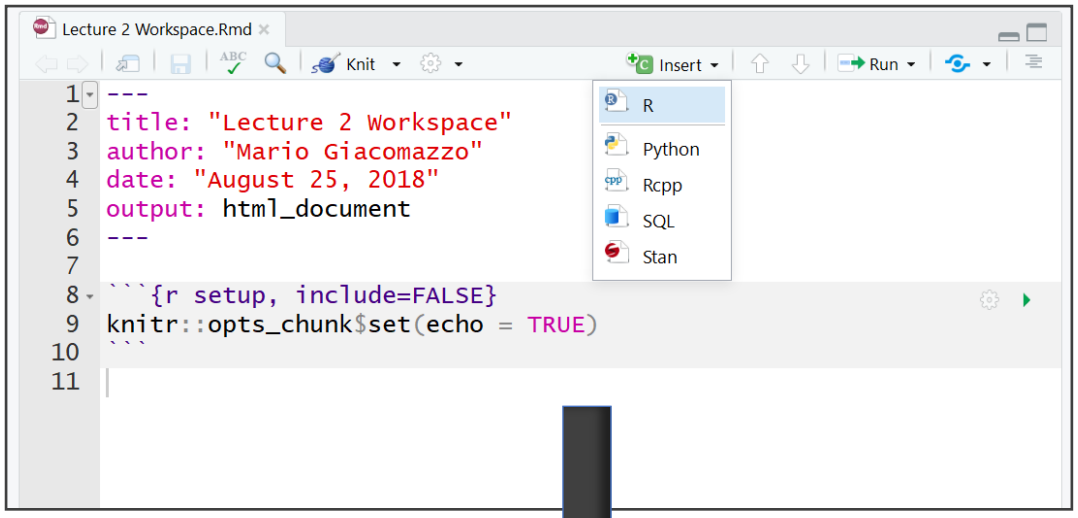
Console

Rmarkdown File

Cheat Sheet

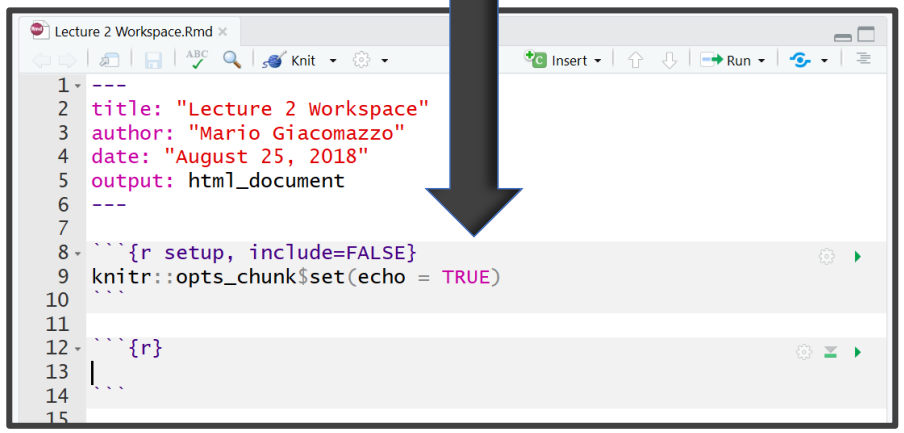
Placing Code in RMarkdown

- Code Chunks (Mini Rscripts)
  - R, Python, SQL, Rcpp (C++)
  - Inserting R Chunks
    - Method 1:



    - Method 2: Ctrl+Alt+I
    - Method 3: Type ```{r} ```

Put R code here



Inline Code in RMarkdown

```
```{r}
a <- c(1,2,3)
```

The sum of vector a is `r sum(a)`.
```

Knit to HTML

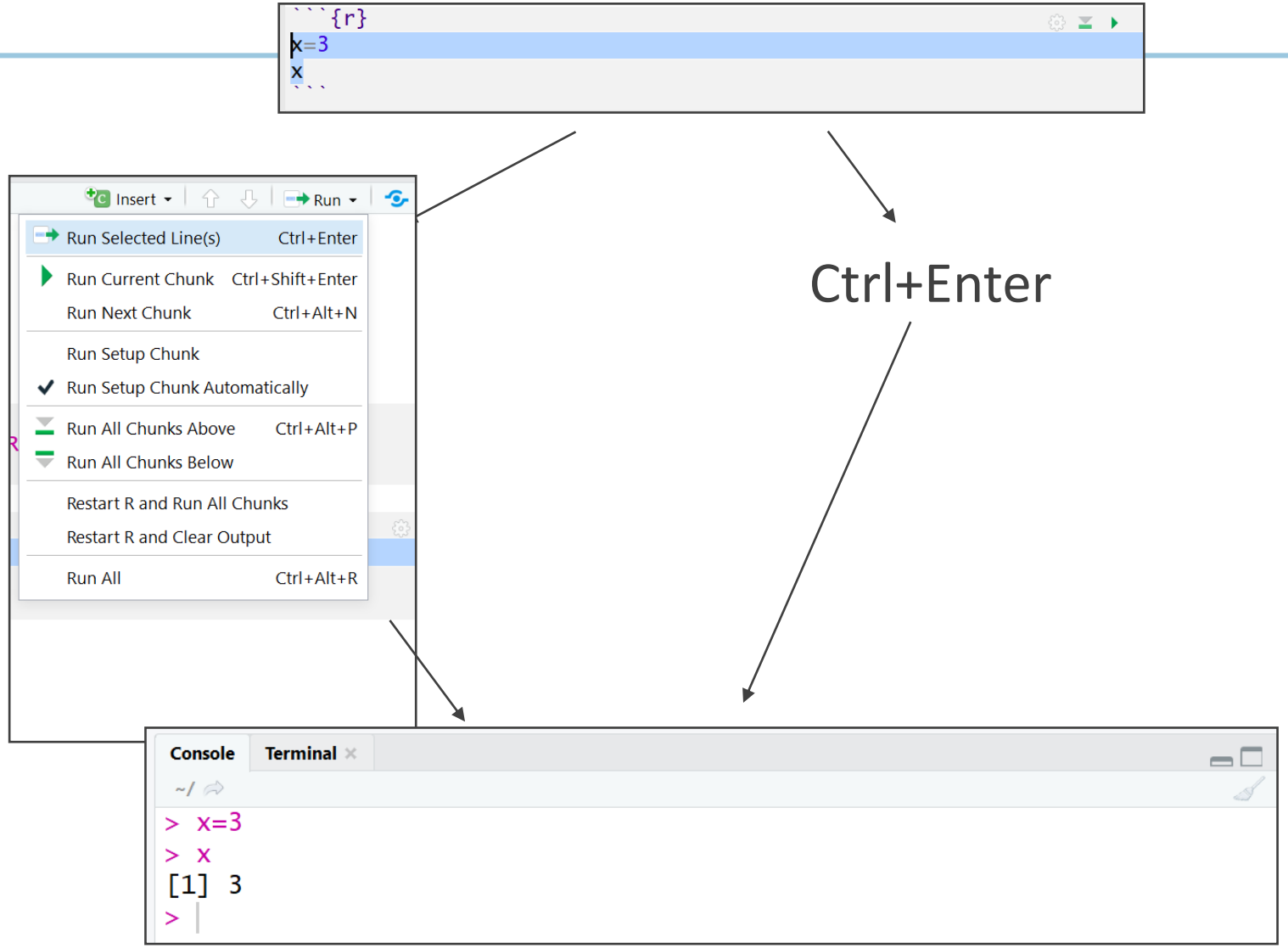
```
a <- c(1,2,3)
```

The sum of vector a is 6.

Evaluate R expression in the Markdown part

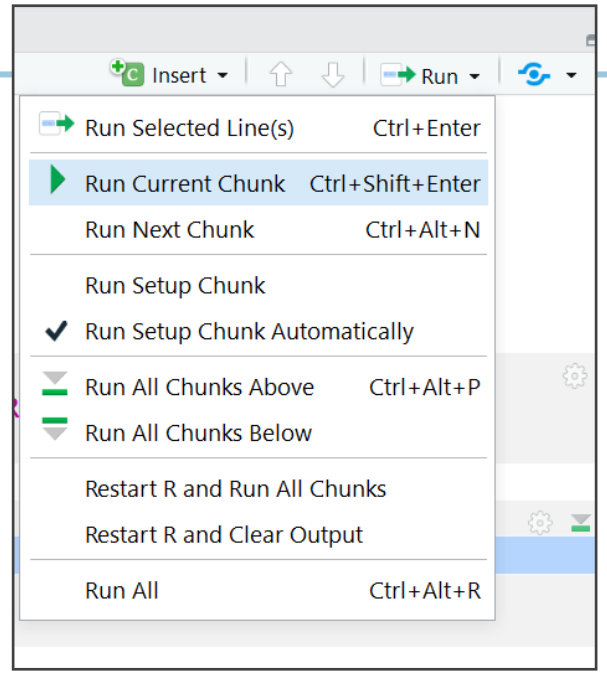
Running Code in RMarkdown

- Various Ways
  - Highlighted Code



Running Code in RMarkdown

- Various Ways (Cont.)
  - Chunking It (Recommended)



Press Play

Ctrl+Shift+Enter

Order

- Order Matters

```{r}
#Created Variables x and y assigned to 3 and 4 respectively
x=3
y=4
print(c(x,y))
```

```{r}
x+y  #Addition
x-y  #Subtraction
x*y  #Multiplication
x/y  #Division
x^y  #Powers
x%%y #Modulus (x mod y)
```

```
Error: object 'x' not found
```

Why?

Environment is empty

Order

- Order Matters (Cont.)
  - Run First Chunk
  - Then, Run Second Chunk

```{r}
#Created Variables x and y assigned to 3 and 4 respectively
x=3
y=4
print(c(x,y))
```

```
[1] 3 4
```

```{r}
x+y  #Addition
x-y  #Subtraction
x*y  #Multiplication
x/y  #Division
x^y  #Powers
x%%y #Modulus (x mod y)
```

```
[1] 7
[1] -1
[1] 12
[1] 0.75
[1] 81
[1] 3
```

```{r}
#Created Variables x and y assigned to 3 and 4 respectively
x=3
y=4
print(c(x,y))
```

```
[1] 3 4
```

Environment | History | Connections

Import Dataset | List

Global Environment

Values

x	3
y	4

Run All Previous Chunks

```{r}
#Created Variables x and y assigned to 3 and 4 respectively
x=3
y=4
print(c(x,y))
```

```
[1] 3 4
```

```{r}
x+y  #Addition
x-y  #Subtraction
x*y  #Multiplication
x/y  #Division
x^y  #Powers
x%%y #Modulus (x mod y)
```

```
[1] 7
[1] -1
[1] 12
[1] 0.75
[1] 81
[1] 3
```

Runs All Previous Chunks

```{r}
log(x)   #Logarithm of x
abs(x-y) #Absolute value of x-y
exp(x)   #e^x
```

- Order Matters (Cont.)

Run All Previous Chunks

```{r}
#Created Variables x and y assigned to 3 and 4 respectively
x=3
y=4
print(c(x,y))
```

```
[1] 3 4
```

```{r}
x+y  #Addition
x-y  #Subtraction
x*y  #Multiplication
x/y  #Division
x^y  #Powers
x%%y #Modulus (x mod y)
```

```
[1] 7
[1] -1
[1] 12
[1] 0.75
[1] 81
[1] 3
```

```{r}
log(x)   #Logarithm of x
abs(x-y) #Absolute value of x-y
exp(x)   #e^x
```

Then, Run Current Chunk

```
[1] 1.098612
[1] 1
[1] 20.08554
```

- Order Matters (Cont.)

Chunk Options

```{r,eval=F}
p3<-p2+geom_smooth(COMPLETE_INSIDE)
p3
```

Option	Run code	Show code	Output	Plots	Messages	Warnings
`eval = FALSE`	-		-	-	-	-
`include = FALSE`		-	-	-	-	-
`echo = FALSE`		-				
`results = "hide"`			-			
`fig.show = "hide"`				-		
`message = FALSE`					-	
`warning = FALSE`						-

Chunk Options

Objects in R: Vector and Matrix

```{r}
#Numeric Vector Named x
x=c(3,2,1,5,7,8)
#Prints x
x
#Third Element of x
x[3]
#Character Vector Named y
y=c("H","T","H","T","H","T")
#Fifth Element of y
y[5]
#3x2 Matrix Named z
z=matrix(c(3,2,1,5,7,8),
  nrow=2,ncol=3,byrow=T)
#Prints z
z
#First Row of z
z[1,]
#1st and 3rd Column of z
z[,c(1,3)]
```

```
[1] 3 2 1 5 7 8
[1] 1
[1] "H"
     [,1] [,2] [,3]
[1,]    3    2    1
[2,]    5    7    8
[1] 3 2 1
     [,1] [,2]
[1,]    3    1
[2,]    5    8
```

- Many Types of Objects
  - Vector and Matrix

Objects in R: Dataframe

```{r}
#Create Tibble named tbl
tbl<-tibble(x=x,y=y)
#Print tbl
tbl
```

x <dbl>	y <chr>
3	H
2	T
1	H
5	T
7	H
8	T

6 rows

```{r}
#Create Dataframe named df
df<-data.frame(x=x,y=y)
#Print df
df
```

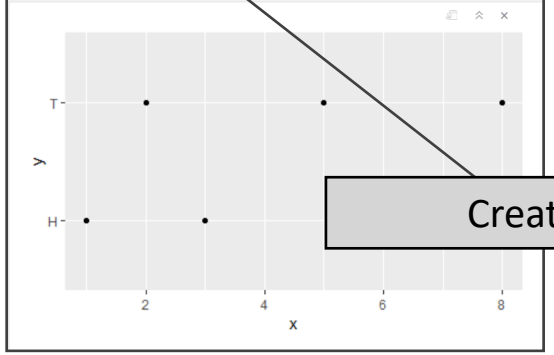
x <dbl>	y <fctr>
3	H
2	T
1	H
5	T
7	H
8	T

6 rows

- Many Types of Objects (Cont.)
  - Tibble/Dataframe

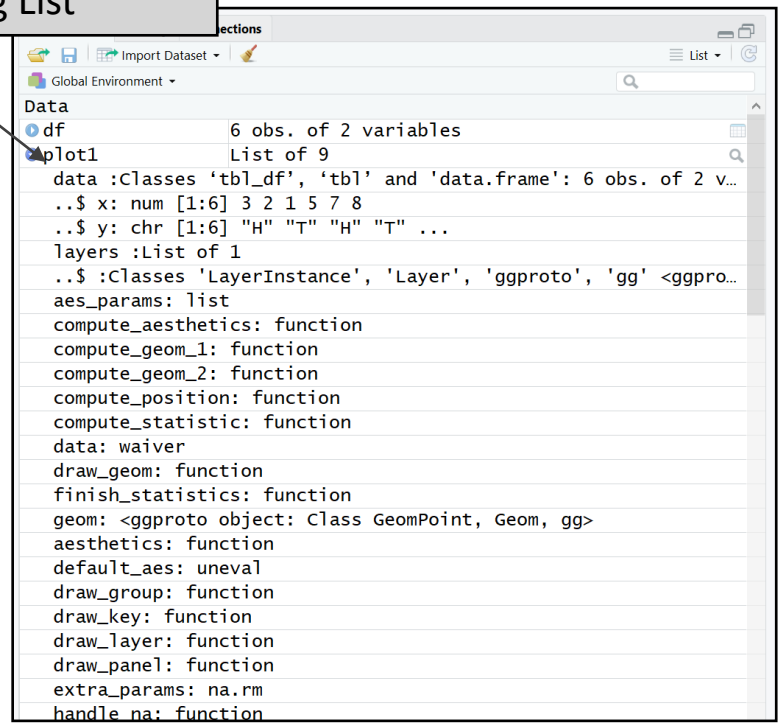
Objects in R: Lists

```{r}
#Create Plot
plot1<-ggplot(data=tbl) +
        geom_point(aes(x=x,y=y))
#Prints Plot
plot1
```



Creates Long List

- Many Types of Objects (Cont.)
  - Lists (Combines Different Objects)



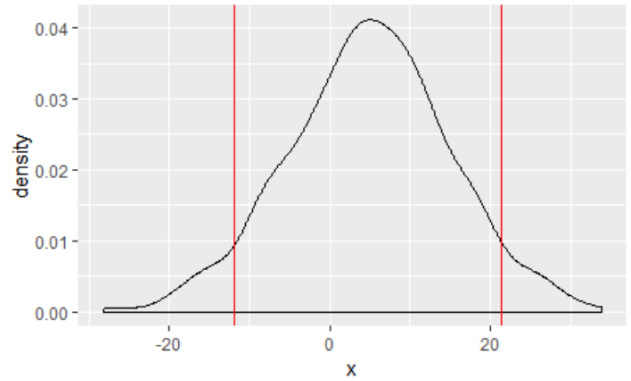
Functions in R

- Many Types of Functions
  - You: Input Objects and Specify Arguments (Defaults Exist)
  - Function: Outputs Objects
  - Example `> quantile()`
    - Input: Vector and Specified Probabilities
    - Output: Desired Percentiles
    - For online help, `> ?quantile`

Functions in R

```
Console   Terminal
~/
> #Randomly Draw 1000 Samples from
> #Normal Distribution with Mean=5 and SD=10
> x=rnorm(1000,mean=5,sd=10)
> mean(x) #Prints Sample Mean
[1] 4.905269
> sd(x)   #Prints Sample SD
[1] 10.01766
> quantile(x) #Default Quantiles (Min,Quartiles,Max)
         0%        25%        50%        75%       100%
-28.232597  -1.480456   5.022031  11.433746  33.929228
> quantile(x,probs=c(0.05,0.95)) #Middle 90%
       5%       95%
-11.98847  21.30757
```

```{r}
quant.x=quantile(x,probs=c(0.05,0.95))
ggplot(data=tibble(x=x))+
  geom_density(aes(x=x))+
  geom_vline(xintercept=quant.x,col="red")
```



- Many Types of Functions (Cont.)
  - Example (Cont.)

Now, let us

PRACTICE

Download the Rmd for Tutorial 2 to Your Computer from the Course Website and open the file in RStudio