THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

STOR 320 Workflow in RMarkdown

Lecture 3

Yao Li

Department of Statistics and Operations Research

UNC Chapel Hill

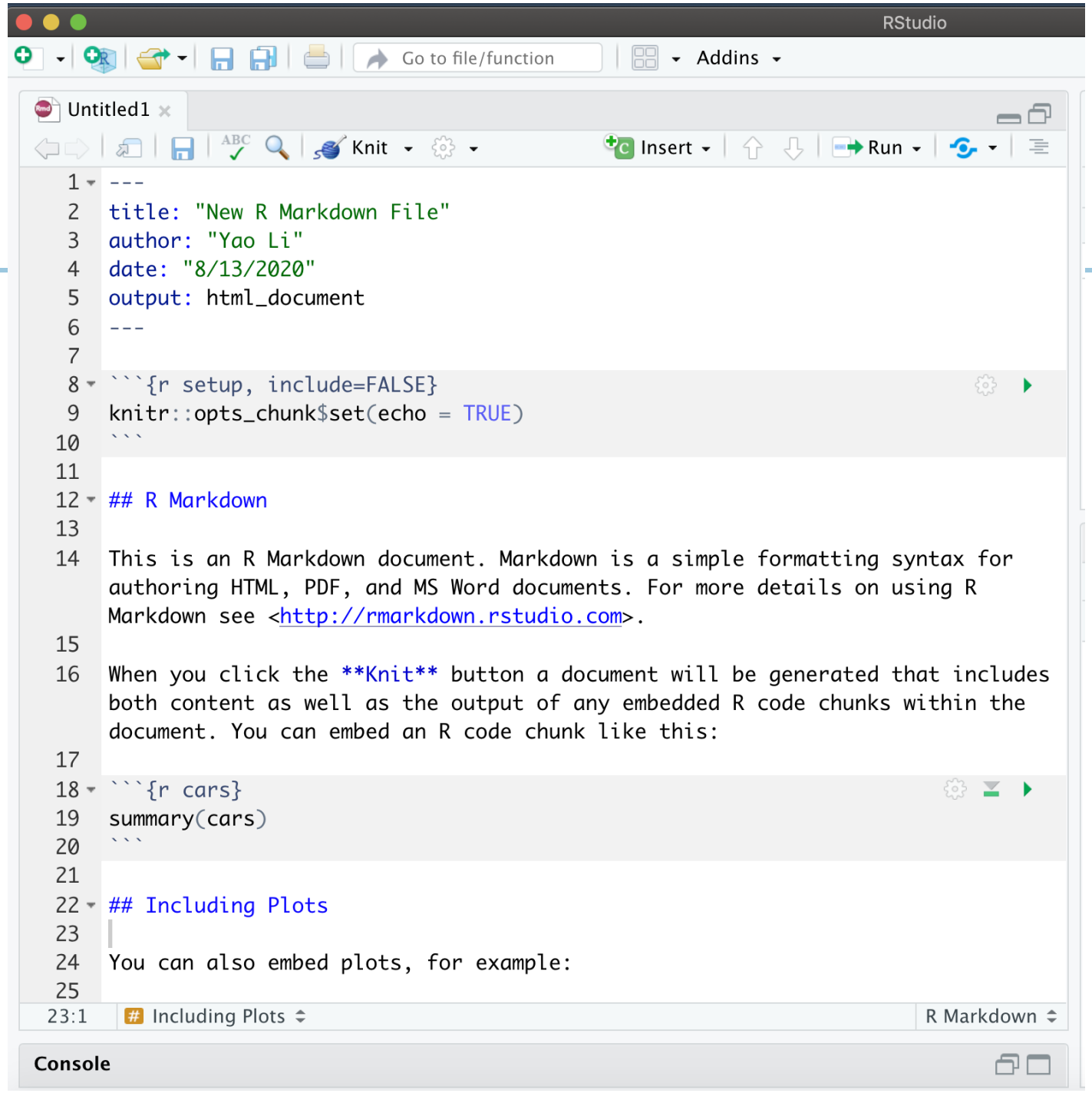
THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Workflow Information

- Chapters Discussing Workflow
  - Chapter 4: Basics (calculation, object, function, etc)
  - Chapter 6: Rscripts (R script, diagnostics)
  - 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

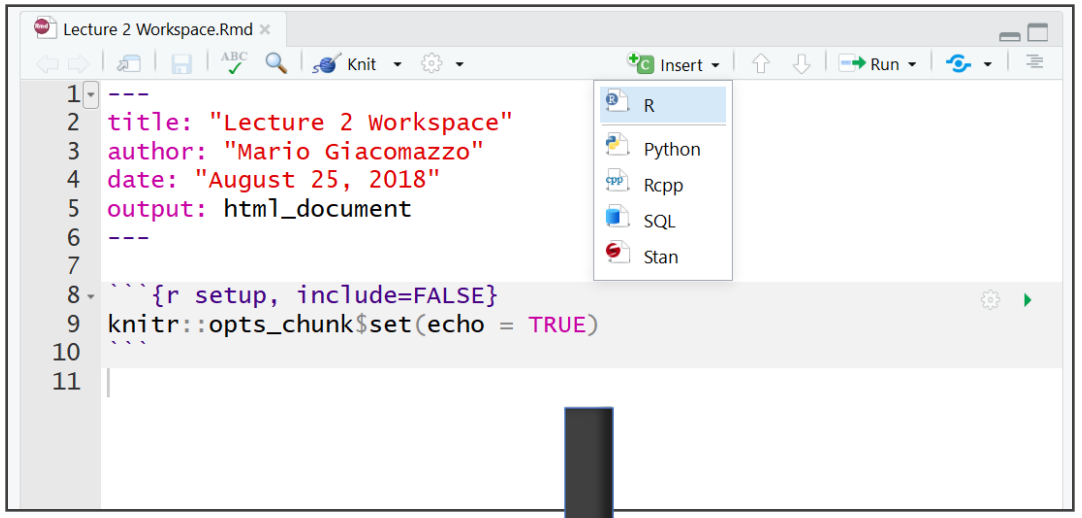


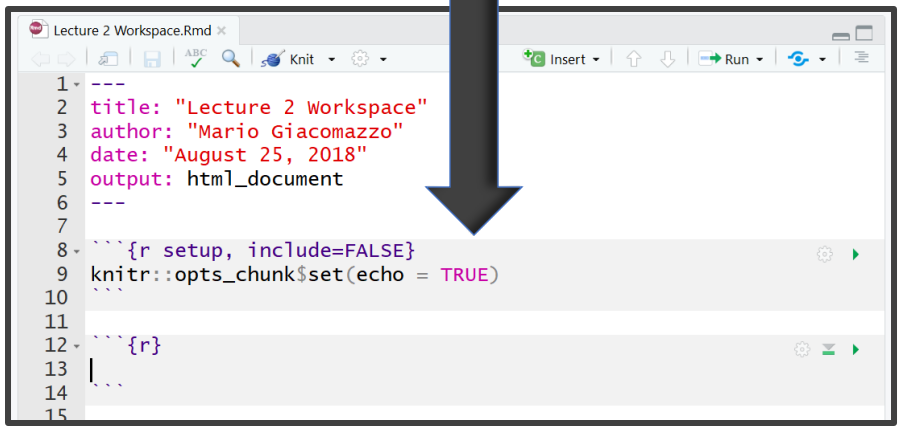
Rmarkdown File

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} ```

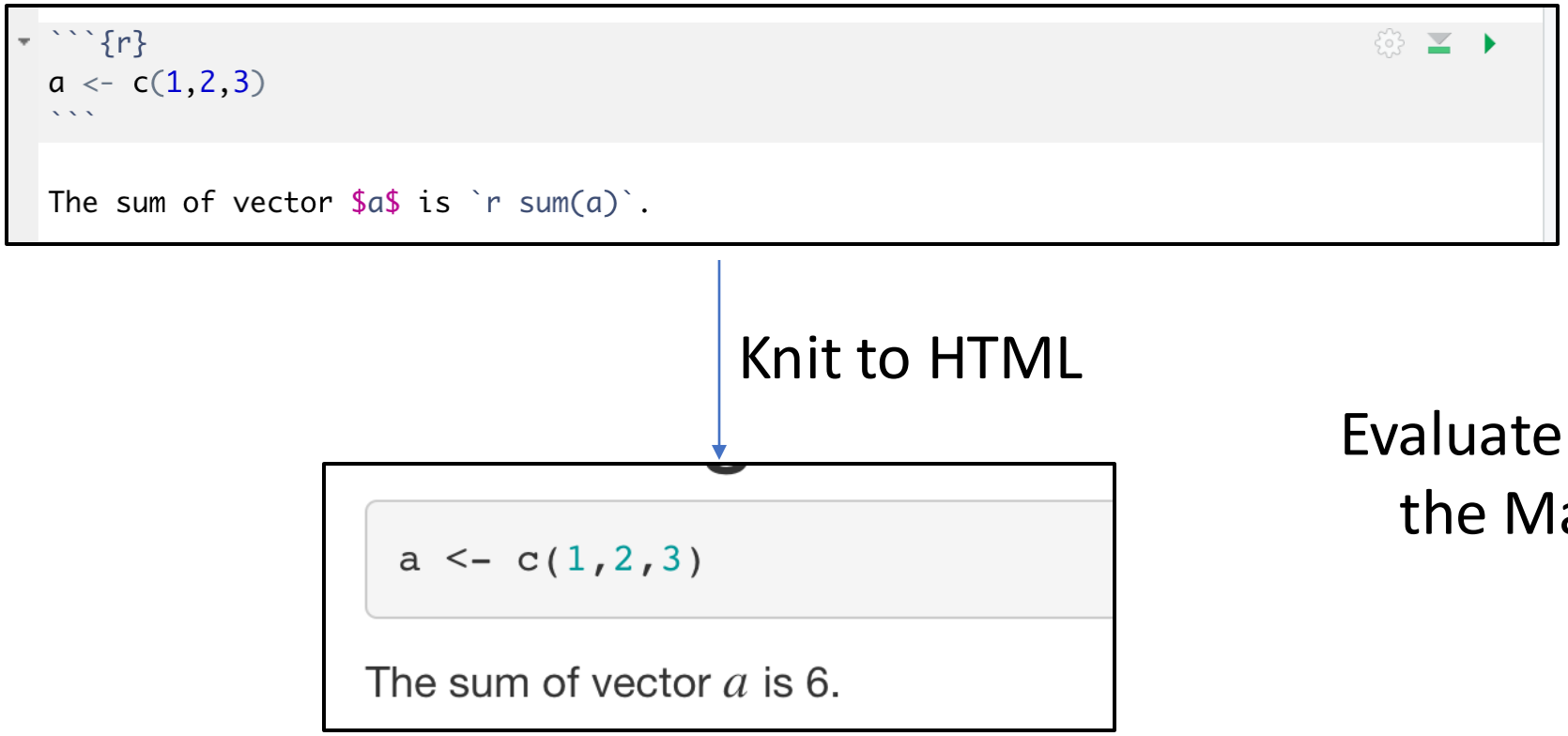




Put R code here

Inline Code in RMarkdown

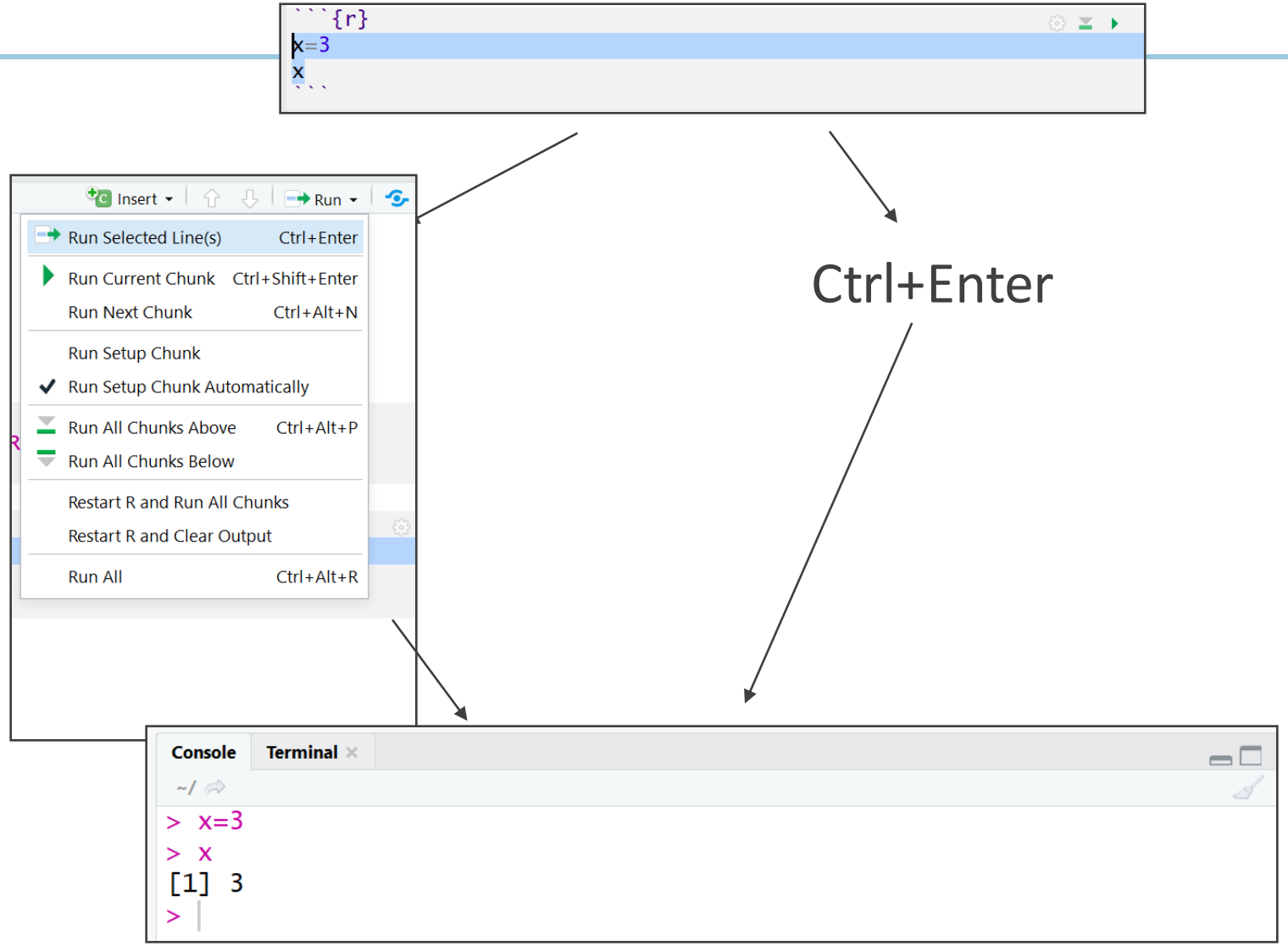
````
```{r}
a <- c(1,2,3)
```

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



Evaluate R expression in the Markdown part

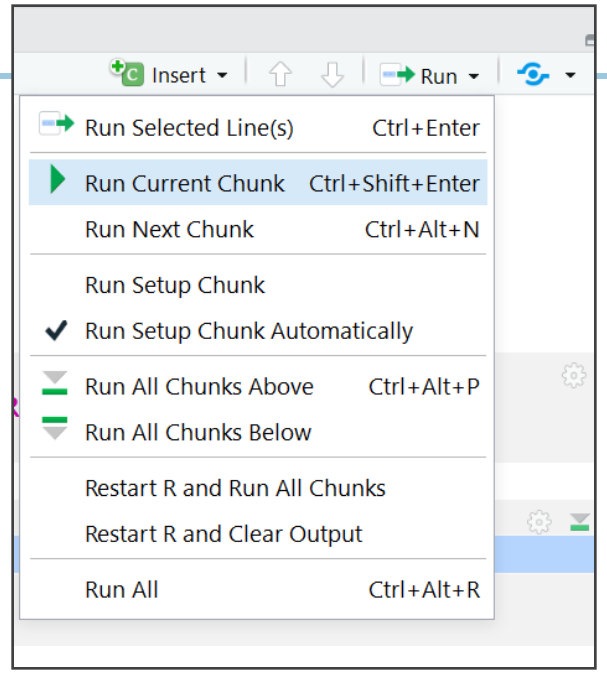
Running Code in RMarkdown

- Various Ways
  - Highlighted Code



Running Code in RMarkdown

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

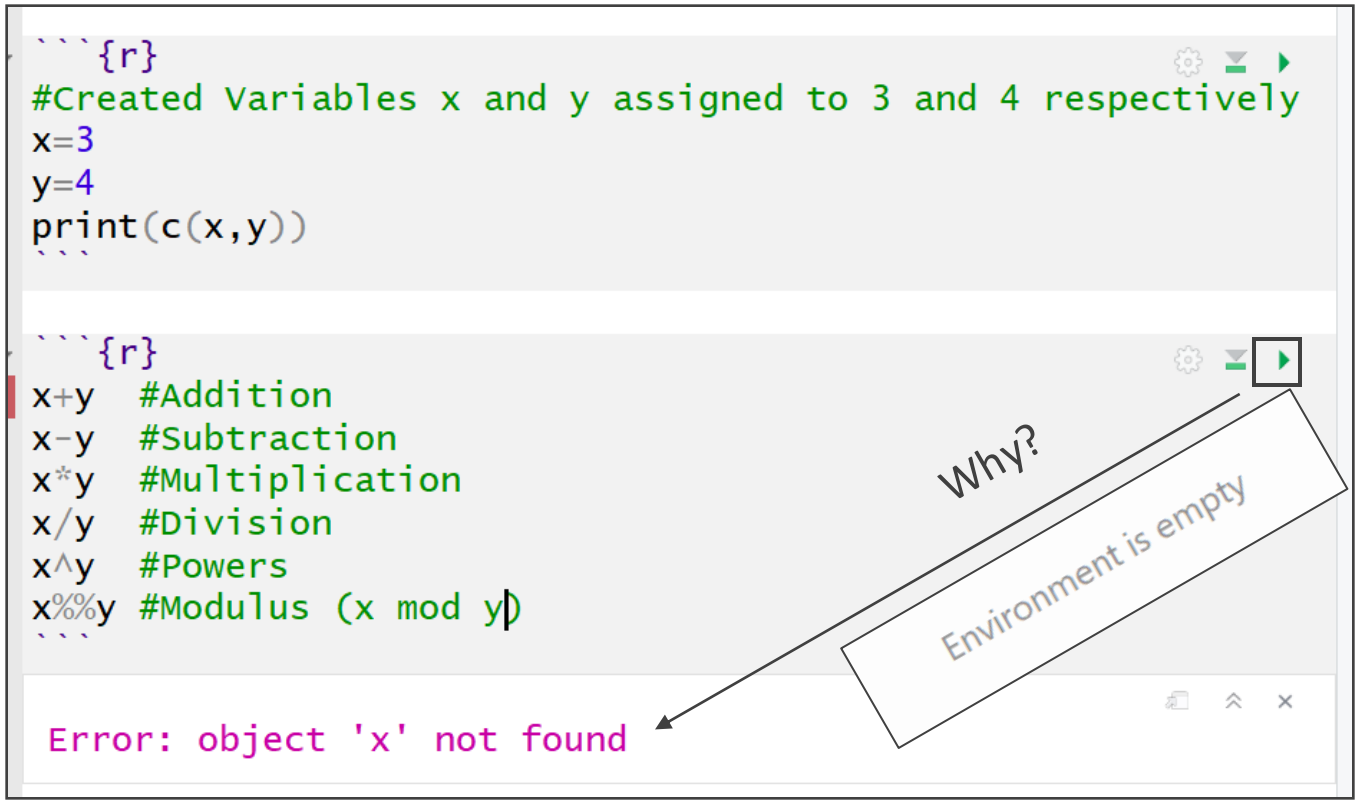


Press Play

Ctrl+Shift+Enter

Order

- Order Matters



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

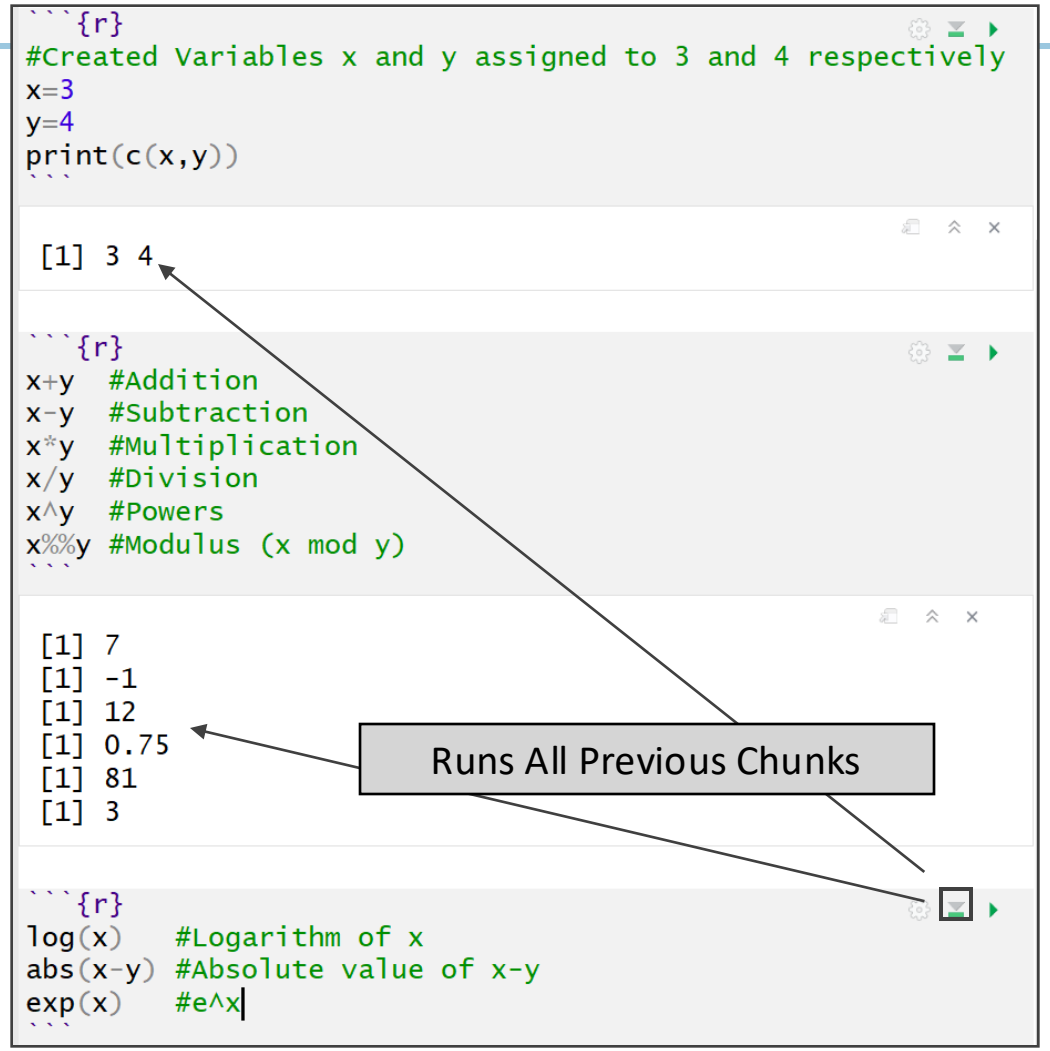
Import Dataset | List

Global Environment

Values

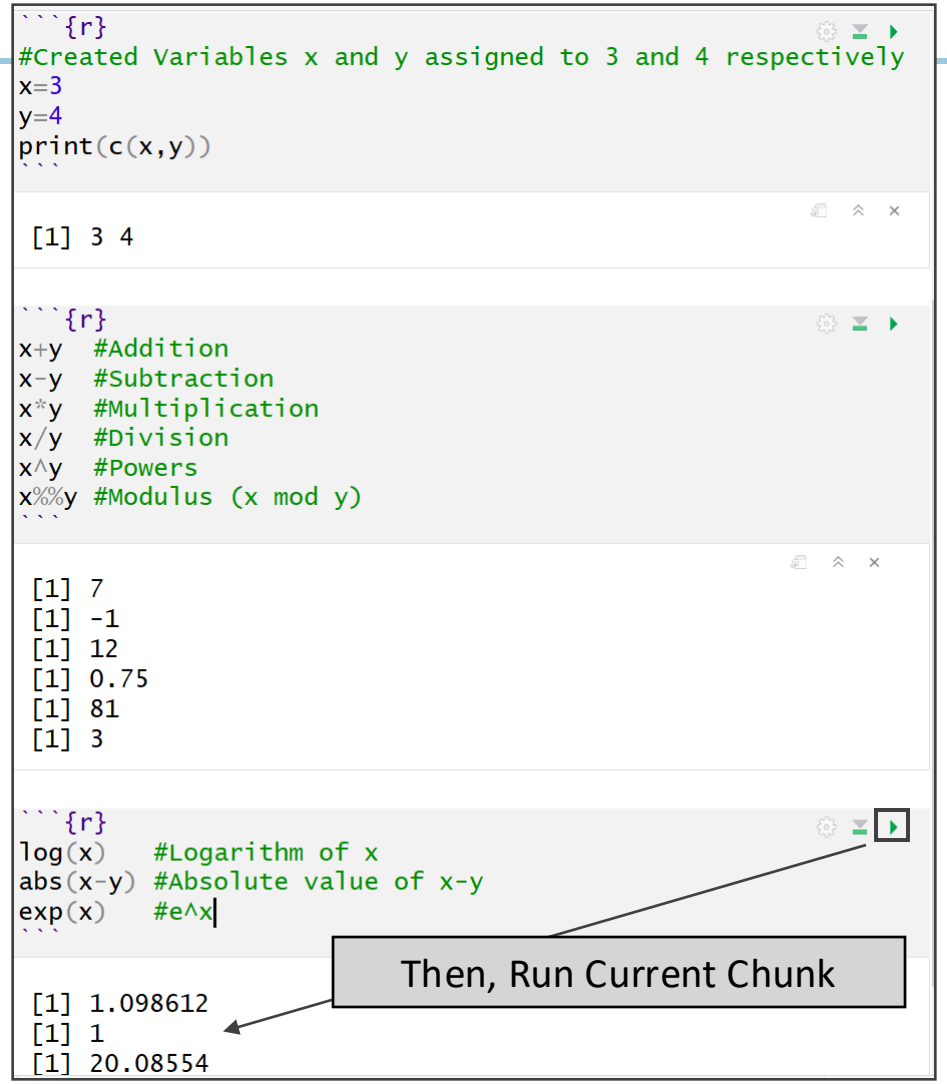
x	3
y	4

Run All Previous Chunks



- Order Matters (Cont.)

Run All Previous Chunks



- 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)]
```

- Many Types of Objects
  - Vector and Matrix

```
[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
```

Objects in R: Dataframe

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

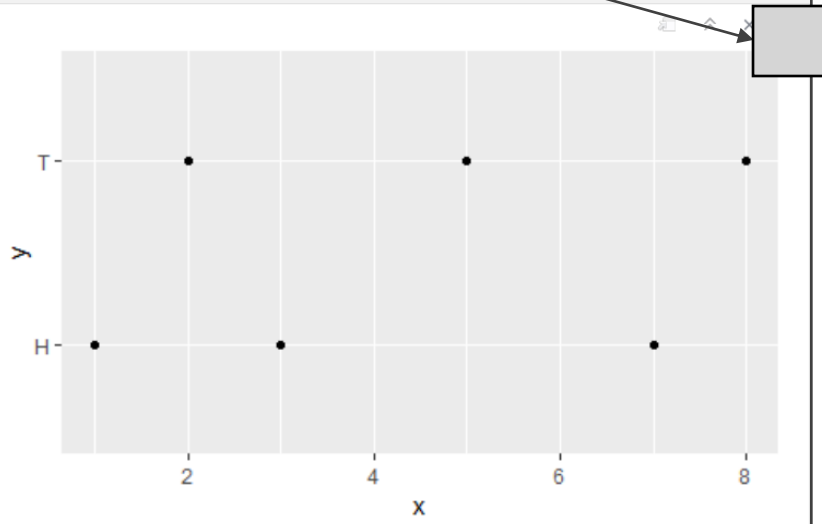
```r
#Create Dataframe named df
df<-data.frame(x=x,y=y)
#Print df
df
```

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

6 rows

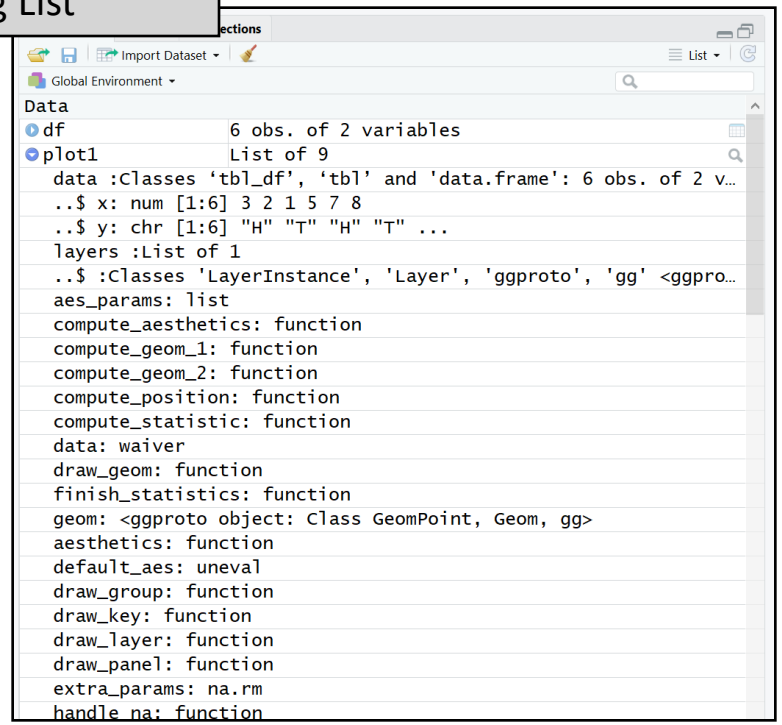
Objects in R: Lists

```{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`

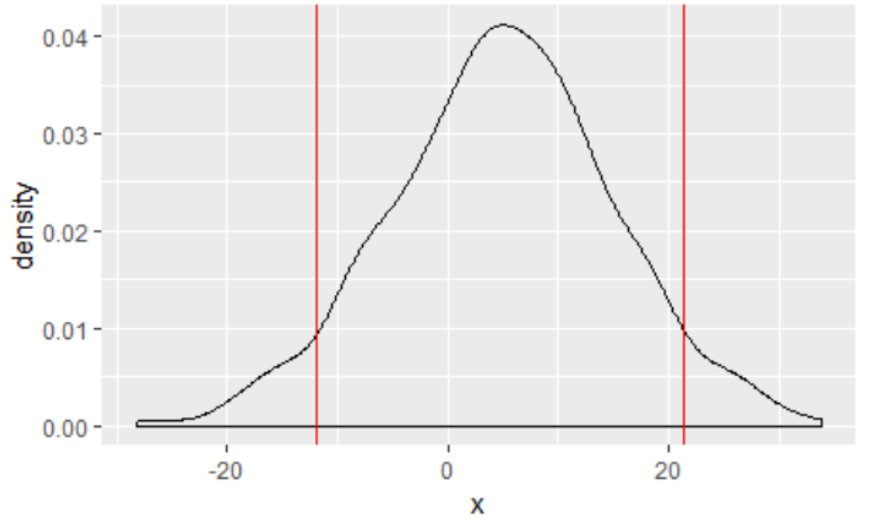
Functions in R

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

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")
```



Rmarkdown Training

Now, let us

PRACTICE

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