



# Programming with R, Week 6

Denis Vrdoljak



# Week 6

- R Notebook
- H2O



SANTA CLARA UNIVERSITY

# R Notebook



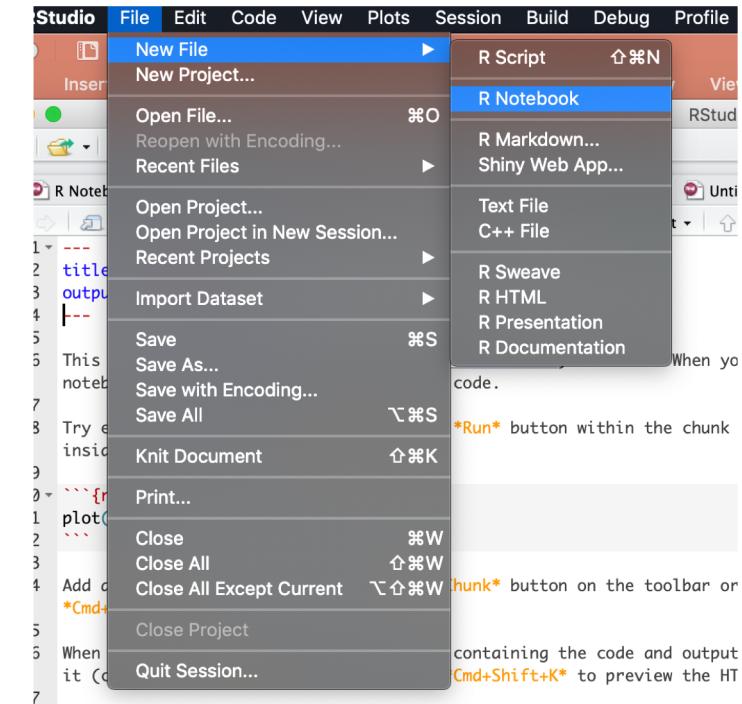
# R Notebook Workflow

- **Open** - Open a file that uses the .rmd extension.
- **Write** - Write content with the easy to use R Markdown syntax
- **Embed** - Embed R code that creates output to include in the report
- **Render** - Replace R code with its output and transform the report into a slideshow, pdf, html or ms Word file.



# Open File

- In the menu bar, click **File ➔ New File ➔ R Notebook**
- When running for the first time,
  - it will install missing packages.
  - Confirm.
- Skeleton rdm file is created





# Skeleton rdm File

The screenshot shows an R Markdown notebook interface. The toolbar at the top includes icons for back, forward, file, preview, and settings. The main area displays the following content:

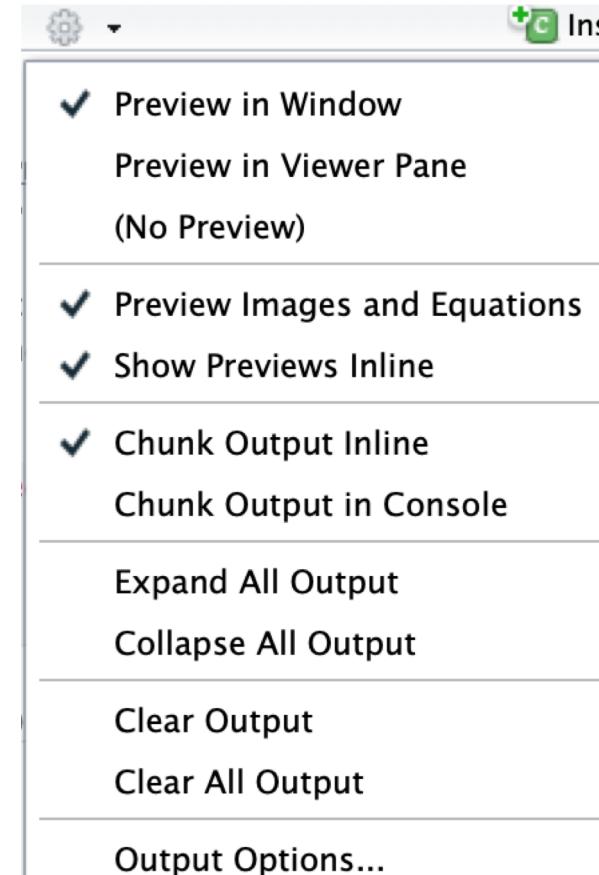
```
1 ---  
2 title: "R Notebook"  
3 output: html_notebook  
4 ---  
5  
6 This is an [R Markdown](http://rmarkdown.rstudio.com) Notebook. When you execute code within the  
notebook, the results appear beneath the code.  
7  
8 Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor  
inside it and pressing *Cmd+Shift+Enter*.  
9  
10 ````{r}  
11 plot(cars)  
12 ````  
13  
14 Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing  
*Cmd+Option+I*.  
15  
16 When you save the notebook, an HTML file containing the code and output will be saved alongside  
it (click the *Preview* button or press *Cmd+Shift+K* to preview the HTML file).  
17
```

A plot of 'cars' data is visible in the preview pane.



# Viewing Options

- By default, the RStudio IDE opens a preview window to display the output of your **.Rmd file**. You can also choose to display the output in a dedicated viewer pane.





# Running the code

```
17 # Running Code  
18  
19 To help see the progress RStudio draws an indicator i  
20  
21 ````{r progress}  
22 Sys.sleep(1); runif(3)  
23 Sys.sleep(1); runif(3)  
24 Sys.sleep(1); runif(3)  
25 Sys.sleep(1); runif(3)  
26 Sys.sleep(1); runif(3)  
27 ````  
  
[1] 0.1078041 0.4994552 0.5423291
```



# Step Through the Code

```
28
29 To run portions of your chunk, *Ctrl+Enter* (OS X: *Cmd+Enter*) to run chunk line by line.
30
31 - ````{r linewise}
32 max.temp <- c(22, 27, 26, 24, 23, 26, 28)
33 max.temp
34
35 par(mfrow=c(1,2)) # set the plotting area into a 1*2 array
36 barplot(max.temp, main="Barplot")
37 pie(max.temp, main="Piechart", radius=1)
38
39
```



# More Options for Stepping Through the Code





# RMD format

- RDM is a format for writing reproducible, dynamic reports with R.
- Use it to embed R code and results into slideshows, pdfs, html documents, Word files and more
- **RMD file** is saved in a format that enables creation of dynamic presentations, reports, and documents.
- It consists of the syntax of markdown with embedded **Rcode** chunks that can be run, which allows the output to be included in the document.



# Write the Content

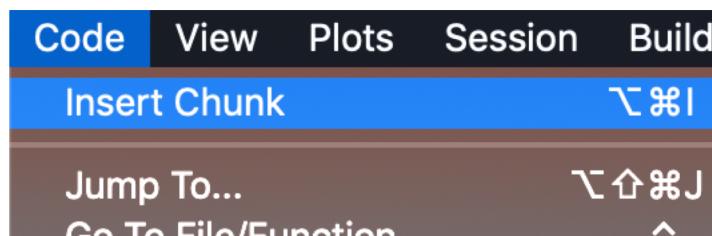
- Write your report in plain text.
- Use markdown syntax to format text in the final report. As example:
  - End a line with two spaces to start a new paragraph.
  - # Header 1
  - ## Header 2
  - ### Header 3

```
15  
16 ## Numerical output  
17  
18 Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing  
*Cmd+Option+I*.  
19  
20
```

# [1] 150 5

# Embed a Chunk

- To embed code, in the menu bar click: **File ➔ Code ➔ Insert Chunk**



- code chunks**

- Start a chunk with `{{r}}.
- End a chunk with `

18 Add a new chunk by clicking the **\*Insert Chunk\*** button on the toolbar or by pressing **\*Cmd+Option+I\***.

19

20 `{{r}}

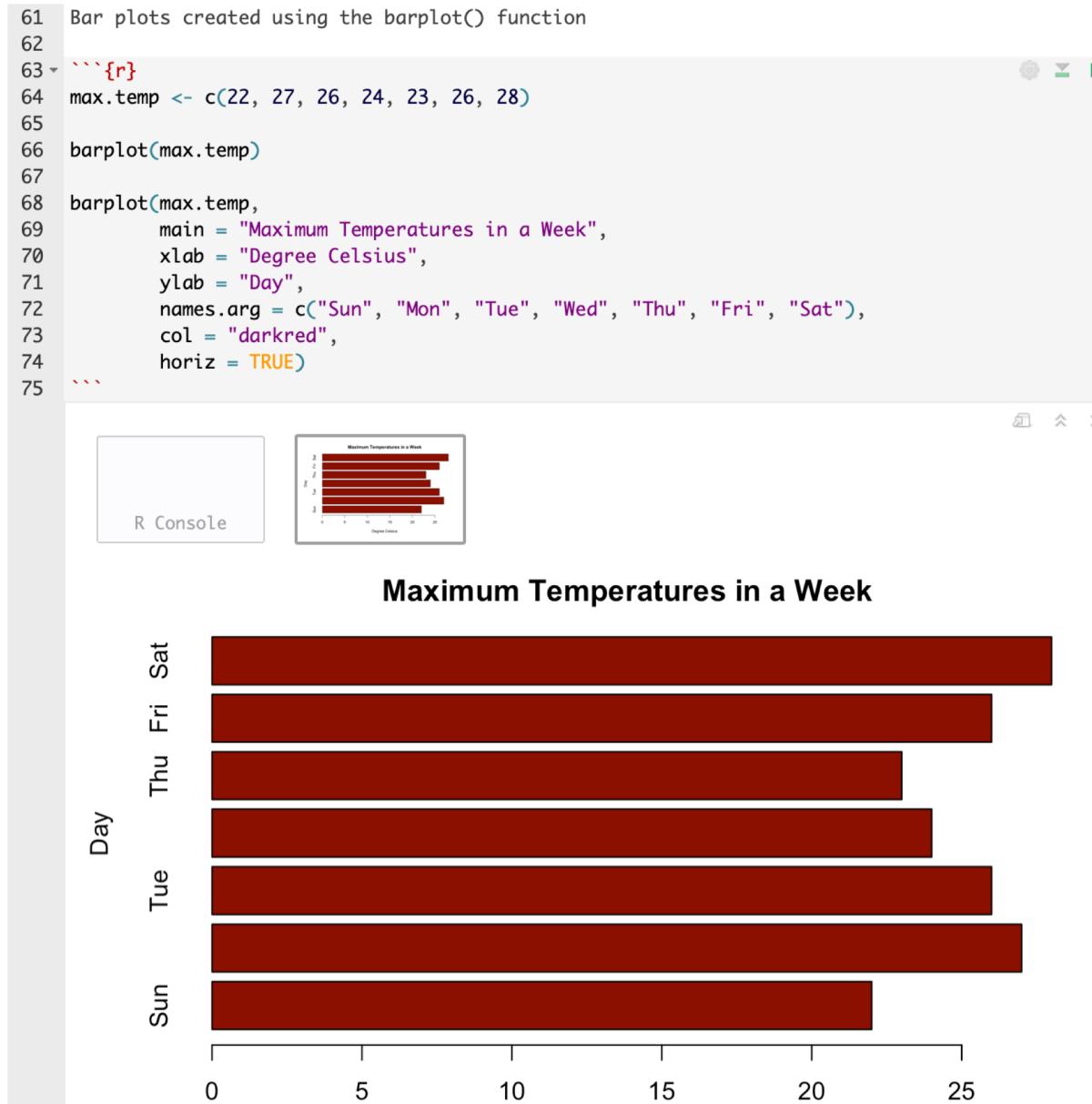
21 |

22

23

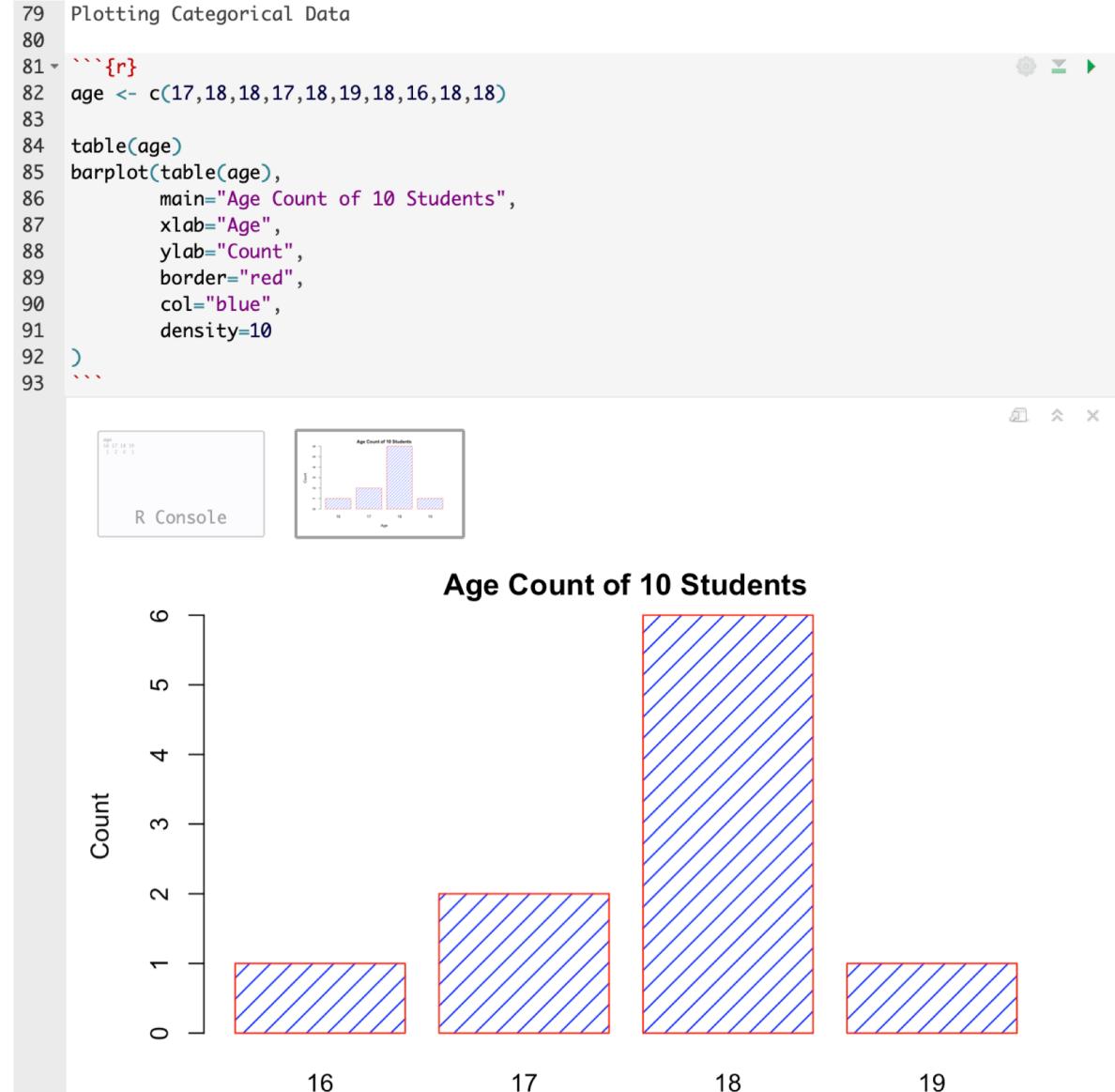


# Example 1

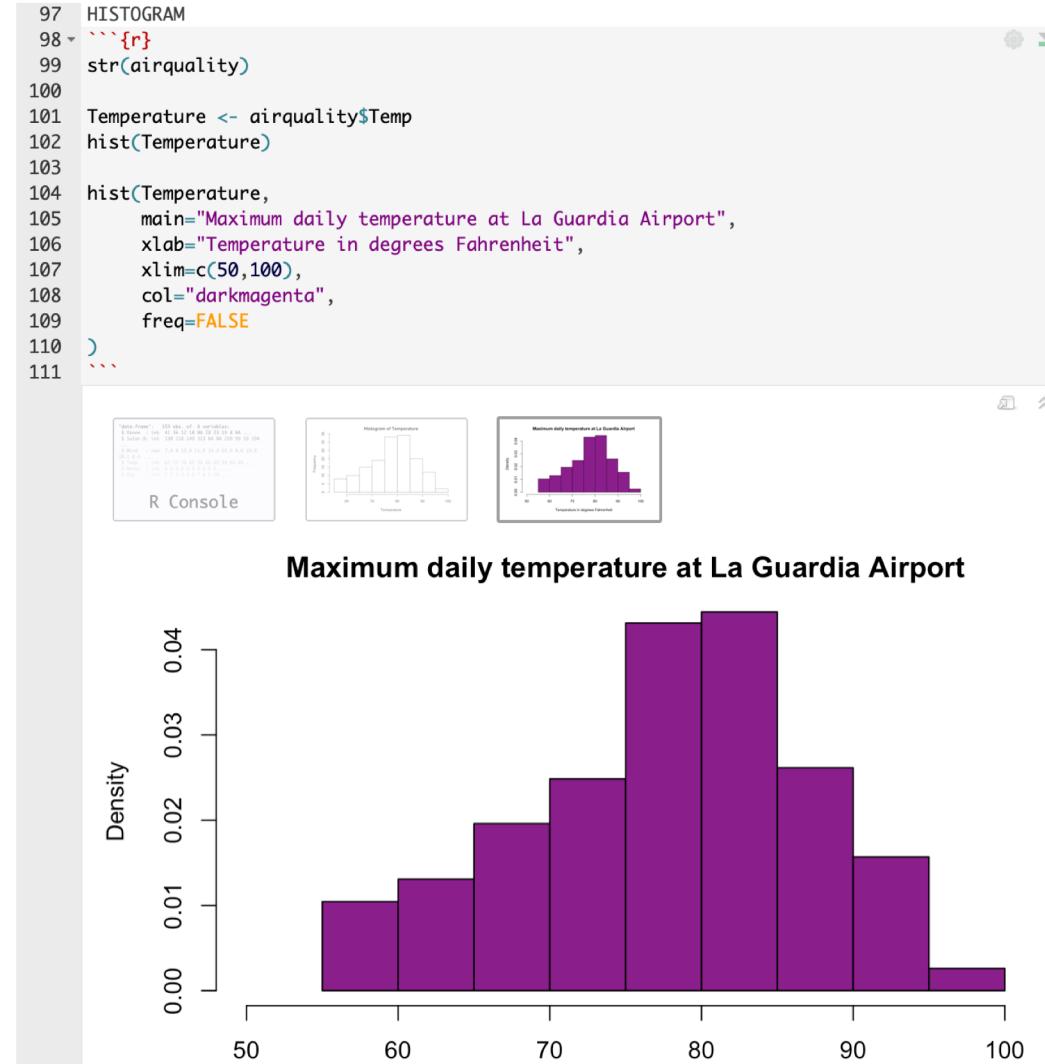




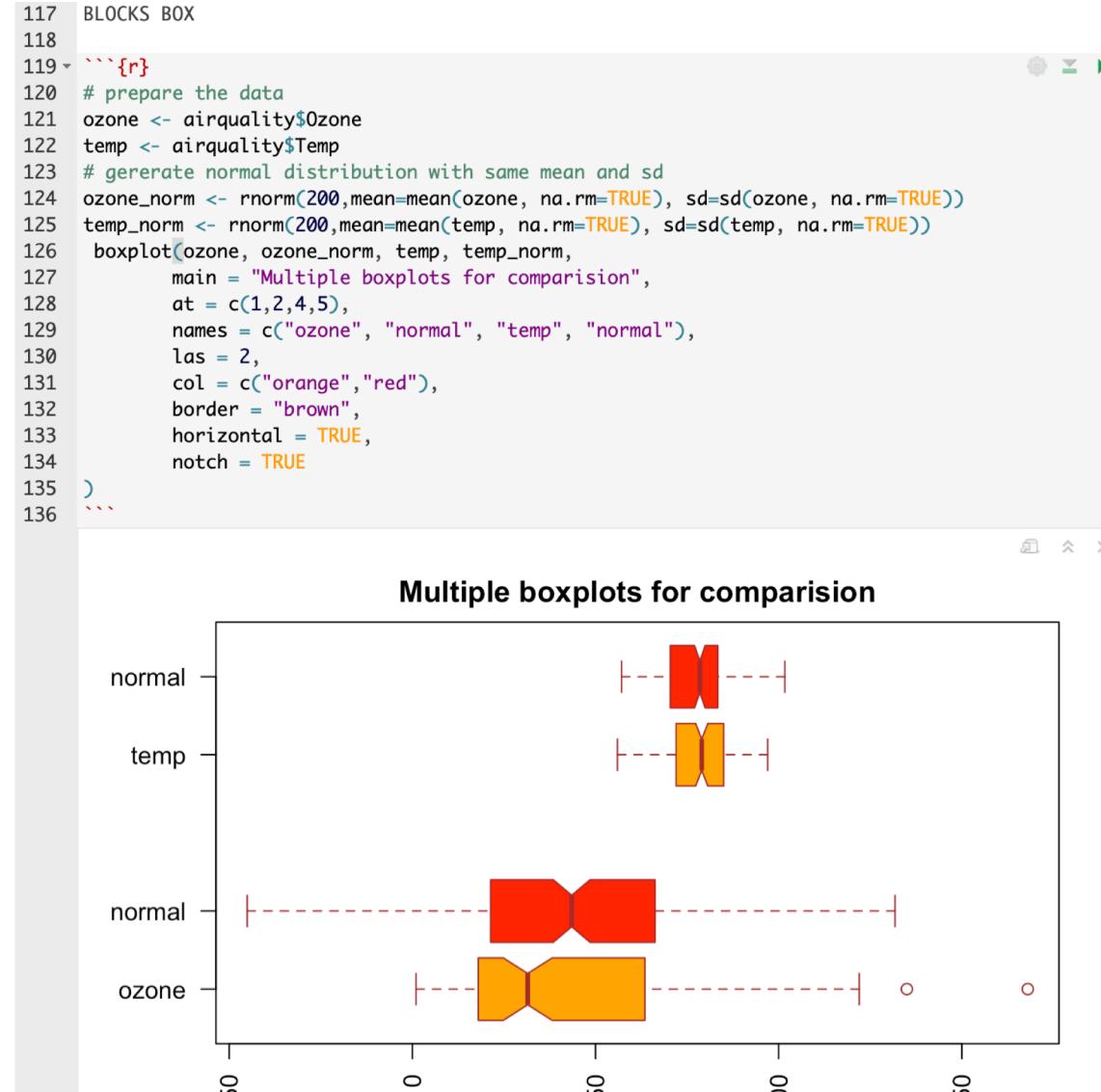
# Example 2



# Example 3

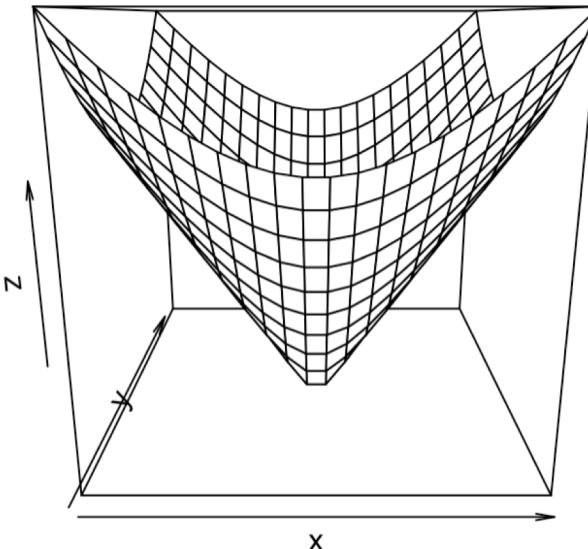


# Example 4



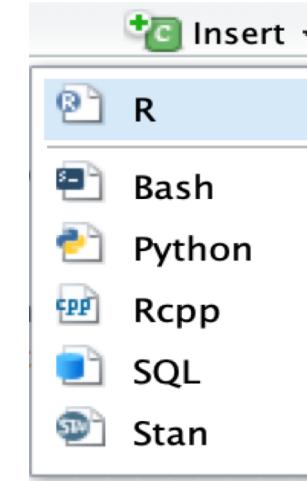
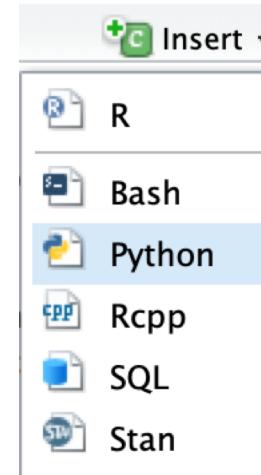
# Example 5

```
140 3D Plot
141
142 ````{r}
143 cone <- function(x, y){
144   sqrt(x^2+y^2)
145 }
146 x <- y <- seq(-1, 1, length= 20)
147 z <- outer(x, y, cone)
148 persp(x, y, z)
149 ````
```



# Embed a Chunk in Different Engines

- You can click on Insert button and choose R
- If no choice is made default is R
- Or choose another engine





# Embedded Python Script

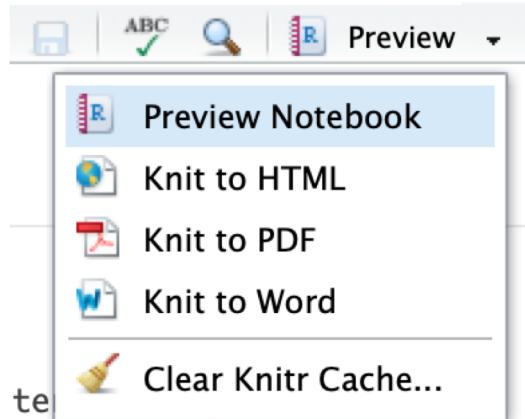
155 By default, R notebook chunks will be run using R. It is possible to write chunks that use  
other engines to execute. For instance, you can add some Python to your notebook:

```
156
157 ```{r python, engine='python'}
158 for i in range(10):
159     print("Your next number is: {}".format(i))
160 print()
161 print("NOTE: Python counts from 0, not 1!")
162 ````
```

```
Your next number is: 0
Your next number is: 1
Your next number is: 2
Your next number is: 3
Your next number is: 4
Your next number is: 5
Your next number is: 6
Your next number is: 7
Your next number is: 8
Your next number is: 9
()
NOTE: Python counts from 0, not 1!
```



# Preview a Notebook



## R Notebook

### Introduction

This is an [R Markdown](#) Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button (green arrow) within the chunk or by placing your cursor inside it and pressing *Cmd+Shift+Enter*.

```
numbers <- seq_len(25)  
numbers
```

### Running Code

To help see the progress RStudio draws an indicator in the editor gutter.

To run portions of your chunk, *Ctrl+Enter* (OS X: *Cmd+Enter*) to run chunk line by line.

```
max.temp <- c(22, 27, 26, 24, 23, 26, 28)  
max.temp  
  
par(mfrow=c(1,2)) # set the plotting area into a 1*2 array  
barplot(max.temp, main="Barplot")  
pie(max.temp, main="Piechart", radius=1)
```

### Creating a chunk

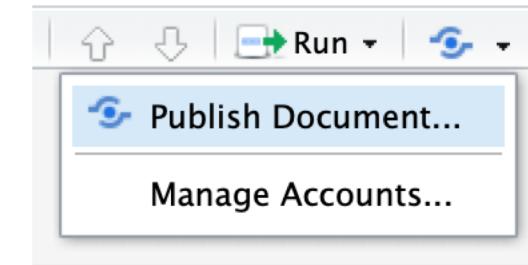
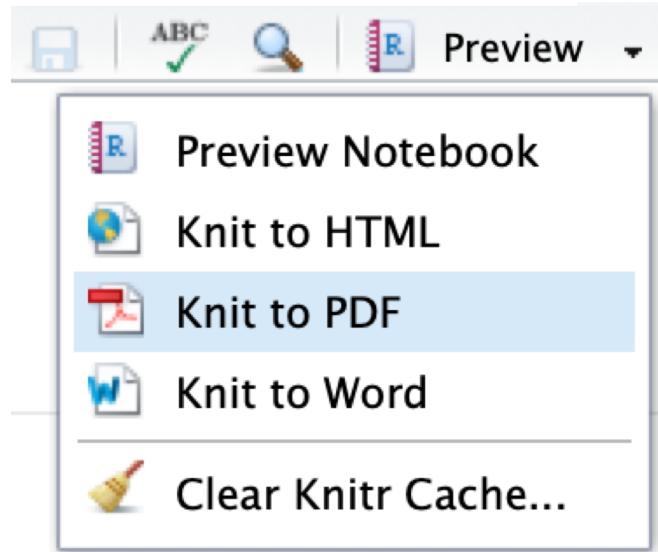
Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing *Cmd+Option+I*.

Add the R code to the chunk

```
ll <- list (list(1:3), list(4:6), list(7:9))  
df <- as.data.frame(ll)  
df
```



# Export to Other Formats and Publish





---

SANTA CLARA UNIVERSITY

# Thank You