

Homework 1 Solutions

- Title, author and date
 - Use a YAML header in your document to do this

```
---
title: Example Markdown document
author: Daniel Anderson
date: "2015-11-11"
---
```

- An R code chunk displaying how to load data into R and store it into an object, along with text explaining the code.

```
65
66 The following lines of code uses the `read.table` function, to read the trees
67 data into an object named `trees`. Columns are separated by a pipe, |,
68 missing data are coded 999, and, and the column names are Girth, Height, and
69 Volume
70
71 ```{r}
72 trees <- read.table("./data/trees.txt",
73   sep = "|", na = "999",
74   col.names = c("Girth", "Height", "Volume"))
75 head(trees)
76 ```
```

The following lines of code uses the `read.table` function, to read the trees data into an object named `trees`. Columns are separated by a pipe, |, missing data are coded 999, and, and the column names are Girth, Height, and Volume

```
trees <- read.table("./data/trees.txt",
  sep = "|", na = "999",
  col.names = c("Girth", "Height", "Volume"))
head(trees)
```

```
##   Girth Height Volume
## 1   8.3     NA     NA
## 2    NA     65     10
## 3    NA     63     NA
## 4  10.5     72     16
## 5  10.7     NA     NA
## 6  10.8     NA     20
```

- A generic ordered or unordered list with at least one level of nesting (could even be a shopping list)

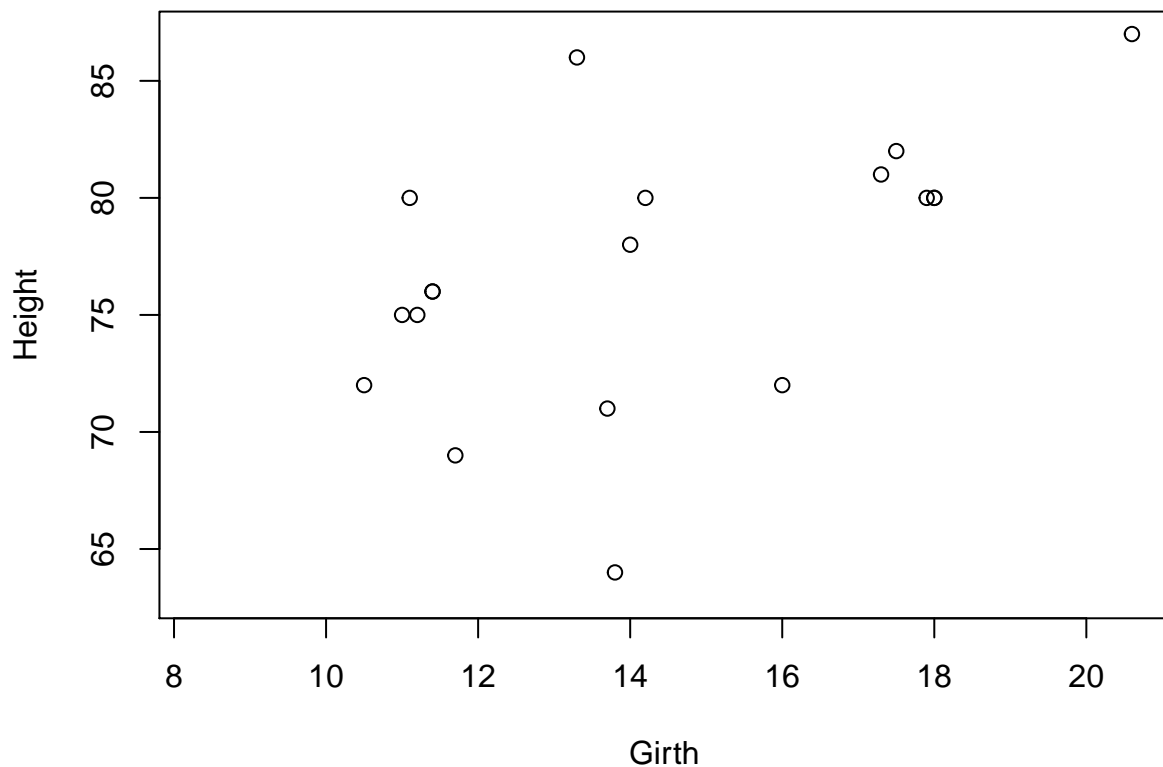
```
87 # Groceries
88 * Dairy
89     + Cheese
90     + Milk
91     + Yogurt
92 * Meat
93     + Ground beef
94     + Pork chops
95 * Snacks
96     + Chips
97     + Crackers
```

Groceries

- Dairy
 - Cheese
 - Milk
 - Yogurt
- Meat
 - Ground beef
 - Pork chops
- Snacks
 - Chips
 - Crackers

- Some R output of some sort

```
108 ```{r}
109 plot(Height ~ Girth, data = trees)
110 ```
```



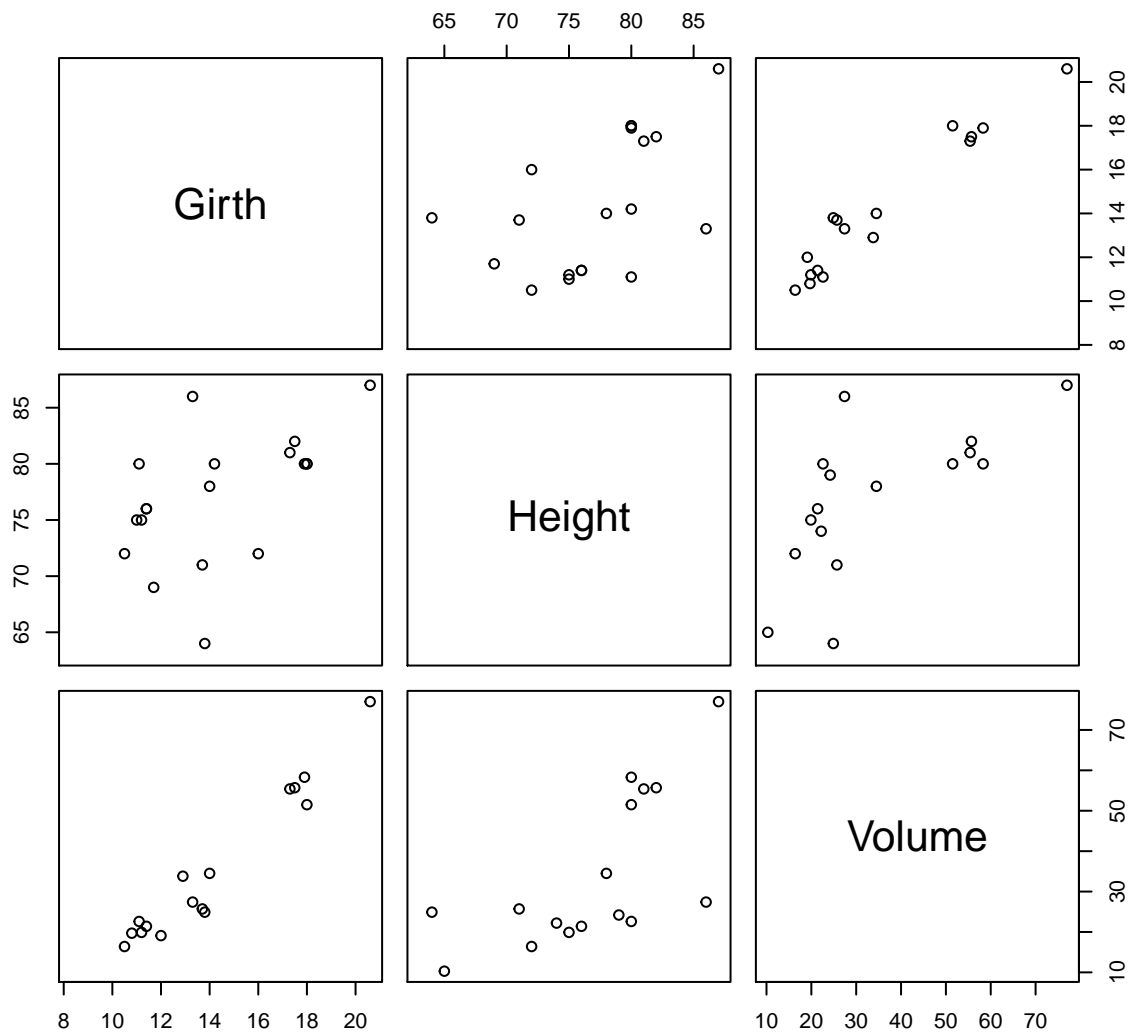
- Calculate the mean of a variable, via `mean()` and display it in text. If there are missing data in the vector that you are trying to calculate the mean from, you will also need to include the additional argument `na.rm = TRUE`. Make some manipulation to the data (e.g., remove a few random cases) and report the mean in text again, using code.

```
125 ```{r, echo = FALSE}
126 options(digits = 2)
127 ```
128 The mean girth of trees in the sample was `r mean(trees$Girth, na.rm = TRUE)`.
129 For trees below 70 feet the mean girth was
130 `r mean( subset(trees, Height < 70)$Girth, na.rm = TRUE )`.
```

The mean girth of trees in the sample was 13.57. For trees below 70 feet the mean girth was 12.75.

Pairs plot

```
pairs(trees)
```



Matrices and Vectors

Create the following matrix (which we created during the first class, if you saved your syntax)

$$\mathbf{m} = \begin{bmatrix} 18 & 32 & 11 & 41 & 73 \\ 61 & 47 & 22 & 87 & 63 \\ 44 & 52 & 23 & 42 & 77 \\ 23 & 17 & 5 & 72 & 83 \end{bmatrix}$$

```
m <- matrix(c(18, 32, 11, 41, 73,
              61, 47, 22, 87, 63,
              44, 52, 23, 42, 77,
              23, 17, 5, 72, 83
              ),
            byrow = TRUE, ncol = 5
            )
m
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   18   32   11   41   73
## [2,]   61   47   22   87   63
## [3,]   44   52   23   42   77
## [4,]   23   17    5   72   83
```

1) Use three different methods to subset the matrix and obtain the following vector

$$\mathbf{v} = \begin{bmatrix} 52 & 42 & 77 \end{bmatrix}$$

```
m[3, c(2,4,5)]

m[, c(2,4,5)][3, ]

m[3, m[3, ] == 52 |
     m[3, ] == 42 |
     m[3, ] == 77 ]

m[3, c(FALSE, TRUE, FALSE, TRUE, TRUE)]

m[3, ][ m[3, ] > 40 &
        m[3, ] != 44 ]

subset(m, c(FALSE, FALSE, TRUE, FALSE),
       select = c(2,4,5), drop = TRUE)
```

```
## [1] 52 42 77
```

```
## [1] 52 42 77
```

```
## [1] 52 42 77
```

```
## [1] 52 42 77
```

```
## [1] 52 42 77
```

```
## [1] 52 42 77
```

2) Subset **m** again to get **v2** = $\begin{bmatrix} 87 & 42 \end{bmatrix}$. Then create a new matrix using the following steps:

- Drop the final column of matrix **m**
- Add **v2** to the second and fourth rows (this will utilize the property of recycling).

One possible method

```
v <- m[c(2,3), 4]  
v
```

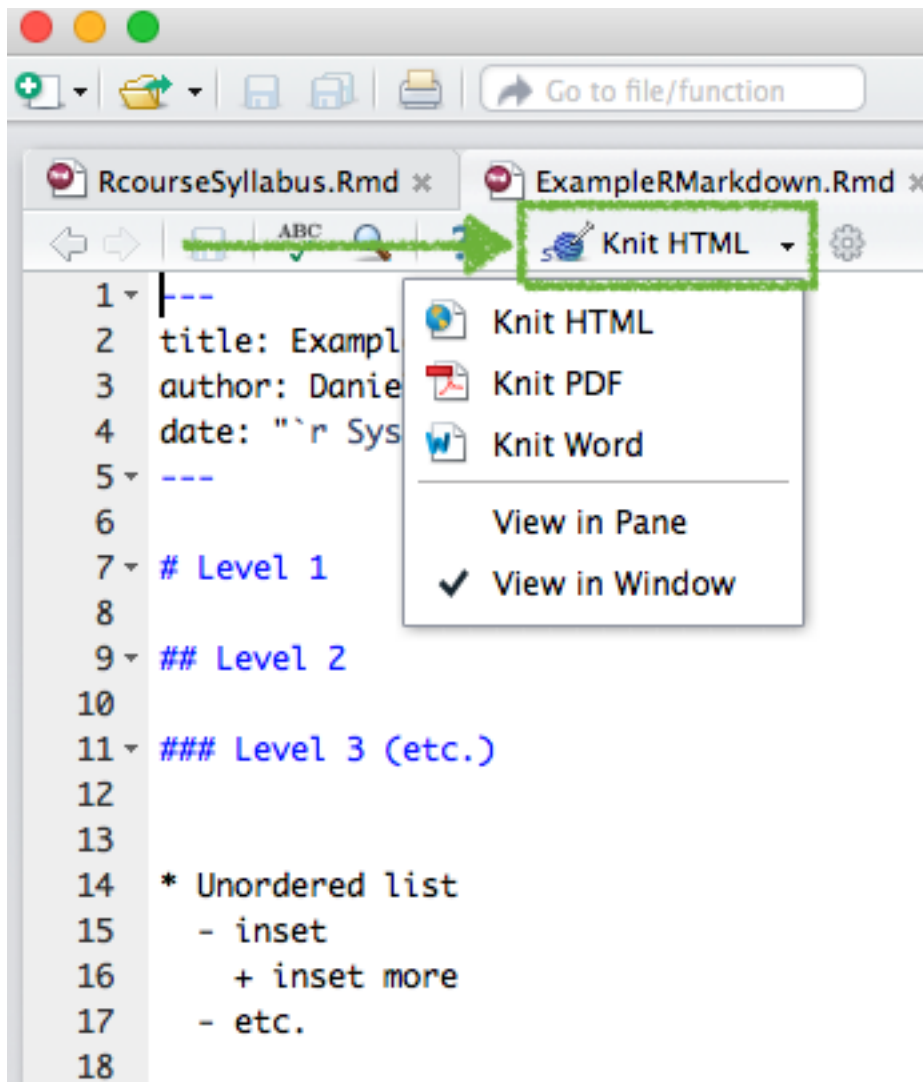
```
## [1] 87 42
```

```
m2 <- m[, -5]  
m2[2, ] <- v + m2[2, ]  
m2[4, ] <- v + m2[4, ]  
m2
```

```
##      [,1] [,2] [,3] [,4]  
## [1,]   18   32   11   41  
## [2,]  148   89  109  129  
## [3,]   44   52   23   42  
## [4,]  110   59   92  114
```

Render the document

Via R Studio



Via code

If you don't have the rmarkdown library installed, first run

```
install.packages("rmarkdown")
```

Then, to render to document

```
library(rmarkdown)
render("yourFile.Rmd", "html_document")
```

Note that your working directory must be set to the same location as the .Rmd file, or you can provide a path to the file in the `render` function.