Numerical explorations with R

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Reading data files

Import dataset

```
> data <- read.csv("bwmal_subset.csv")
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- Once read in, assigning the loaded data to objects
- Datasets in R are typically stored as data frames, which have a matrix structure
- Observations are arranged as rows and variables, either numerical or categorical, are arranged as columns
- Dataset contains 8 demographic variables for 20 individuals

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- Dataset contains 8 demographic variables for 20 individuals

Get the dimension of the dataset

```
> dim(data)
```

```
[1] 21  8
```

Viewing data

Explore variable names of the dataset

```
> names(data)
```

```
[1] "X"         "matage"    "mheight"   "gestwks"   "sex"       "bweight"
[8] "pfplacen"
```

R has ways to look at the dataset at a glance

```
> head(data) #Returns first six rows of dataset
```

```
  X matage mheight gestwks sex bweight smoke pfplacen
1 1     26   1.575      40   0    3.11     0        0
2 2     23   1.529      40   0    2.65     0        0
3 3     18   1.540      40   1    3.41     0        0
4 4     25   1.581      40   1    2.99     0        0
5 5     25   1.555      40   1    3.16     0        0
6 6     21   1.561      40   1    2.82     0        0
```

We can access variables directly by using their names, using the object $ variable notation ■tidy=TRUE■= data*gestwksChecklastsixrowsofthedataset*

```
> tail(data) #Returns first six rows of dataset
\end{Sinput}
\begin{Soutput}
     X matage mheight gestwks sex bweight smoke pfplacen
16 195     19   1.583      37   0    2.42     0        0
17 196     20   1.534      39   1    2.93     0        0
18 197     30   1.543      39   0    2.59     1        1
19 198     38   1.602      39   0    2.48     1        0
20 199     20   1.540      40   1    3.02     1        1
21 200     24   1.503      39   0    2.79     0        1
\end{Soutput}
```

day2_lesson1_numericalExplorations.vrb

Viewing data

To access a certain entry, we most commonly use object[row,column]
Single cell value

```
> data[2,3]
```

```
[1] 1.529
```

Omitting row value implies all rows; here all rows in column 3

```
> data[,3]
```

```
 [1] 1.575 1.529 1.540 1.581 1.555 1.561 1.590 1.502 1.666 1.5
[13] 1.540 1.502 1.560 1.583 1.534 1.543 1.602 1.540 1.503
```

More data viewing

Omitting column values implies all columns; here all columns in row 2

```
> data[2,]
```

```
  X matage mheight gestwks sex bweight smoke pfplacen
2 2     23   1.529      40   0    2.65     0         0
```

Can also use ranges - rows 2 and 3, columns 2 and 3

```
> data[2:3, 2:3]
```

```
  matage mheight
2     23   1.529
3     18   1.540
```

Data summaries

- Enables us to see the main characteristics of data before any formal modeling or hypothesis testing
- Particular techniques depends on the type of variable: Continuous or categorical
- Continuous eg. age, height
- Categorical eg. smoking status, sex

Some data explorations: Continuous variables

```
> #some data explorations
> mean(data$mheight)

[1] 1.558571
```

Some data explorations: Continuous variables

```
> #some data explorations
> mean(data$mheight)

[1] 1.558571

> var(data$mheight)

[1] 0.001461357
```

Some data explorations: Continuous variables

```
> #some data explorations
> mean(data$mheight)
[1] 1.558571
> var(data$mheight)
[1] 0.001461357
> sd(data$matage)
[1] 5.527852
> median(data$matage)
[1] 22
```

More data explorations

Produce various summaries of continous variable

```
> summary(data$matage)  #sumarize continous variable

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  17.00   20.00   22.00   23.57   25.00   38.00
```

Explorations for categorical variables

Summarize single categorical variable

```
> table(data$sex)
```

```
 0  1
11 10
```

Cross-tabulation of two categorical variables

```
> table(data$sex,data$smoke)
```

```
   0 1
 0 8 3
 1 9 1
```

Alternative cross tabulation

Using *'with'* command includes variable labels in the table

```
> with(data, table(sex,smoke))
```

```
   smoke
sex 0 1
  0 8 3
  1 9 1
```

Use R as calculator

```
> 1000-2*10^2/(8+2)  #expression to evaluate
[1] 980
> #Built-in functions:
> log(1.4)  #returns the natural logarithm of the number 1.4
[1] 0.3364722
> log10(1.4)  # returns the log to the base of 10
[1] 0.146128
> sqrt(16)  #returns the square root of 16
[1] 4
```

Calculations with assignment statements

We can store a value(s) in an R object using the assignment symbol $<-$ ("less than" followed by a hyphen)

```
> x <- 2.5
```

To check what is in a variable type the variable name

```
> x
```

```
[1] 2.5
```

Can store a computation under a new R object or change the current value stored in an old object

```
> y <- 3*log(x)
```