*Stat 622/422 (Dr. Baron) Advanced Biostatistics*

**First steps in R. Variables, summary, folders, data sets**

**# Vectors and simple operations**

> x <- c(1,3,5,6) **# Create a vector (c means concatenate)**

> x = c(1,3,5,6) **# Another way to define a vector**

> x

[1] 1 3 5 6

> x[2] **# Get the 2nd element of vector x**

[1] 3

> x[2:4] **# Get all elements of x from the 2nd to the 4th**

[1] 3 5 6

> x = rnorm(10000,2,100) **# Generate a vector of 10,000 Normal random** **variables**

**# with mean 2 and st. deviation 100**

**# Basic statistics**

> mean(x)

[1] 2.379067

> sd(x)

[1] 100.0676

**# Arithmetic operations**

> x = c(1,3,5,7,0,-1)

> x

[1] 1 3 5 7 0 -1

> x^2

[1] 1 9 25 49 0 1

> sin(x)

[1] 0.8414710 0.1411200 -0.9589243 0.6569866 0.0000000 -0.8414710

> log(x)

[1] 0.000000 1.098612 1.609438 1.945910 -Inf NaN

Warning message:

In log(x) : NaNs produced

**# Define a matrix A based on a vector x**

> A = matrix(x,2,3)

> A

[,1] [,2] [,3]

[1,] 1 5 0

[2,] 3 7 -1

**# READING DATA FROM EXTERNAL FILES**

**# To point to the right folder, go "File" -> "Change dir..." or use the setwd command**

**# Which folder is R pointed to right now?**

> getwd()

[1] "C:/Users/baron/Documents"

**# Let's change the folder to the one where we have data. Notice slashes.**

> setwd("C:/Users/baron/Advanced Biostatistics/data")

**# Use read.csv(“file.csv”) to read CSV viles, read.table("file.txt") to read text files**

**# Rda and Rdata files should be opened with load("file.rda")**

> load("Heart.rda")

**# Or, load data from a public domain**

> Heart = read.csv("http://fs2.american.edu/baron/www/622/R/Heart.csv")

**# Find out what variables are in the set**

> dim(Heart)

[1] 303 15

> names (Heart)

[1] "X" "Age" "Sex" "ChestPain" "RestBP" "Chol"

[7] "Fbs" "RestECG" "MaxHR" "ExAng" "Oldpeak" "Slope"

[13] "Ca" "Thal" "AHD"

> summary (Heart)

X Age Sex ChestPain

Min. : 1.0 Min. :29.00 Min. :0.0000 Length:303

1st Qu.: 76.5 1st Qu.:48.00 1st Qu.:0.0000 Class :character

Median :152.0 Median :56.00 Median :1.0000 Mode :character

Mean :152.0 Mean :54.44 Mean :0.6799

3rd Qu.:227.5 3rd Qu.:61.00 3rd Qu.:1.0000

Max. :303.0 Max. :77.00 Max. :1.0000

RestBP Chol Fbs RestECG

Min. : 94.0 Min. :126.0 Min. :0.0000 Min. :0.0000

1st Qu.:120.0 1st Qu.:211.0 1st Qu.:0.0000 1st Qu.:0.0000

Median :130.0 Median :241.0 Median :0.0000 Median :1.0000

Mean :131.7 Mean :246.7 Mean :0.1485 Mean :0.9901

3rd Qu.:140.0 3rd Qu.:275.0 3rd Qu.:0.0000 3rd Qu.:2.0000

Max. :200.0 Max. :564.0 Max. :1.0000 Max. :2.0000

MaxHR ExAng Oldpeak Slope Ca

Min. : 71.0 Min. :0.0000 Min. :0.00 Min. :1.000 Min. :0.0000

1st Qu.:133.5 1st Qu.:0.0000 1st Qu.:0.00 1st Qu.:1.000 1st Qu.:0.0000

Median :153.0 Median :0.0000 Median :0.80 Median :2.000 Median :0.0000

Mean :149.6 Mean :0.3267 Mean :1.04 Mean :1.601 Mean :0.6722

3rd Qu.:166.0 3rd Qu.:1.0000 3rd Qu.:1.60 3rd Qu.:2.000 3rd Qu.:1.0000

Max. :202.0 Max. :1.0000 Max. :6.20 Max. :3.000 Max. :3.0000

NA's :4

Thal AHD

Length:303 Length:303

Class :character Class :character

Mode :character Mode :character

**# Look at the data as a spreadsheet**

> fix(Heart)

**# Refer to the particular variable in this dataset with $ sign...**

> Heart$Age

[1] 63 67 67 37 41 56 62 57 63 53 57 56 56 44 52 57 48 54 48 49 64 58 58

< truncated >

**# or attach it the dataset that you plan to work with...**

> attach(Heart)

**# Descriptive statistics: mean and the 5-number summary**

> mean(Heart$Chol)

[1] 246.6931

> summary(Chol)

Min. 1st Qu. Median Mean 3rd Qu. Max.

126.0 211.0 241.0 246.7 275.0 564.0

**# PLOTS.**

**# Before you do anything with the data, look at them.**

> plot(Age,Chol)

A graph with numbers and dots

AI-generated content may be incorrect.

**# Axis labels, graph title, color**

> plot(Age, Chol, xlab="Patient’s Age", ylab="Level of Cholesterol", main="Plot of Cholesterol", col="blue", lwd=3)

A graph of a patient's age

AI-generated content may be incorrect.

**# SCATTERPLOT MATRIX #**

**# Use it to plot more than 2 variables.**

**# First, partition the graphing window into a matrix**

> par(mfrow=c(4,4))

**# Then fill each non-diagonal space with the corresponding scatterplot**

> pairs(~Age+RestBP+Chol+MaxHR)

A screenshot of a computer screen

AI-generated content may be incorrect.

**# Saving a graph in a file**

> pdf("filename.pdf")

> plot(Chol, RestBP, col="blue")

> dev.off()

windows

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**# Finish and quit R**

> q()