# Computational Analysis Assignment I

124384 Luycer Bosire

2/2/2021

Question One

a. Use the file "Women.txt" from the course website and read this into R. What is the dimension of the data you have just read in R?

#Reading the .txt file into R,

```
women<- read.table("Women.txt", header=TRUE)
```

Next, check the dimension of this table. We may also go further ahead and show the first and last three items from the table. We'll realise that the table has 17 rows and 3 columns. This data can be easily viewed

```
dim(women)

## [1] 17  3

head(women,3)

##   height weight age
## 1     58    115  33
## 2     59    117  34
## 3     60    120  37

tail(women,3)

##    height weight age
## 15     72    164  37
## 16     71    160  NA
## 17     73    161  35

View(women)
```

b. Use the file "Women.txt" from the course website and read this into R. A new woman joined the study, she is 66" tall, 165lbs and 34 years. Append this information to your data.

```
new.woman<-data.frame(height="66",weight="165",age="34")
women1<-rbind(women,new.woman)
women1

##    height weight  age
## 1      58    115   33
## 2      59    117   34
## 3      60    120   37
```

```
## 4      61    123   31
## 5      62    126   31
## 6      63    129   34
## 7      64    132   31
## 8      65    135   39
## 9      66    139   35
## 10     67    142   34
## 11     68    146   34
## 12     69    150   36
## 13     70    154   33
## 14     71    159   30
## 15     72    164   37
## 16     71    160 <NA>
## 17     73    161   35
## 18     66    165   34
```

c. Use the file "Women.txt" from the course website and read this into R. How many women have a weight under 140?

```
with(women,women$weight<140) #From this, It returns the first 9 values as
less than 140 and the rest as greater than.

##  [1]  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE FALSE FALSE
FALSE
## [13] FALSE FALSE FALSE FALSE FALSE
```

We can obtain similar results by suing the below function, as the above one is quite tedious ovr manually counting the TRUE values from the output;

```
sum(women$weight<140)

## [1] 9
```

d. Use the file "Women.txt" from the course website and read this into R. There is a correction to the woman in row D, her age should be 39. Change the age in row D to 39. You're then required to sort your data by weight and store the results in a new data set.

```
women<- read.table("Women.txt", header=TRUE)
women2<-replace(women$age,4,39)
women2

##  [1] 33 34 37 39 31 34 31 39 35 34 34 36 33 30 37 NA 35
```

e. Use apply to generate a summary report, with the mean, median, sd of height, weight and age.

The question requires the mean,median and standard deviation using apply function which is mainly used to avoid loops. It takes three arguments; x-dataframe Margin-1 is for row operations and 2 column operations FUN- the function to be applied,e.g mean,median and sd

Before applying the function, there is need to omit incomplete cases if they exist.

```
attach(women)
women2<-na.omit(women)
mean<-apply(women2,2,FUN = ("mean"))
median<-apply(women2,2,FUN="median")
sd<-apply(women2,2,FUN="sd")
```

f. Use the apply function to get the mean, median and sd of the columns and create a matrix with row names, mean, median and sd.

```
t(data.frame(mean,median,sd))
```

```
##           height    weight       age
## mean   65.500000 138.25000 34.000000
## median 65.500000 137.00000 34.000000
## sd      4.760952  16.15549  2.503331
```

g. Write a function to calculate BMI.

```
attach(women)
```

```
## The following objects are masked from women (pos = 3):
##
##     age, height, weight
```

```
BMI = function(height,weight){(0.45455*weight/(.0254*height)^2)}
Women_BMI<- BMI(height,weight)
Women_BMI
```

```
##  [1] 24.08552 23.68078 23.48513 23.28947 23.09412 22.89933 22.70535
22.51237
##  [9] 22.48232 22.28707 22.24586 22.19767 22.14312 22.22259 22.28913
22.36235
## [17] 21.28602
```

h. Do the women have a BMI within a recommended range for their height (Normal =18.5-24.9)? You require an R code to answer this.

#Using the sum function and logic and (&) operator to get the count of values within the normal range.

```
sum(Women_BMI>18.5 & Women_BMI<24.90)
```

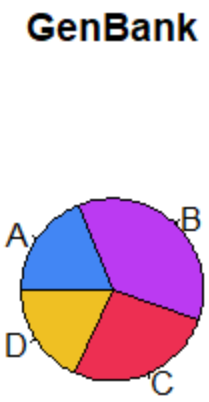
```
## [1] 17
```

#This means all the 17 women are within the normal range.

Question 2 a. You're required to load the library "ape" and then read the data bank as follows>bank<-table(read.GenBank(c("X94991.1"), as.character=TRUE)) You're then required to produce a pie char of the data bank in both 2D and 3D. Label your pie chart appropriately.

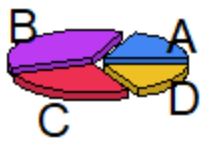
```
library(ape)
library(plotrix)
```

```
bank<-table(read.GenBank(c("X94991.1"), as.character=TRUE))
bank

##
##   a   c   g   t
## 410 789 573 394

colors = c('#4286f4','#bb3af2','#ed2f52','#efc023')
labels=c("A","B","C","D")
pie(bank, labels, main='GenBank', col=colors, init.angle=180, clockwise=TRUE)
```




```
colors = c('#4286f4','#bb3af2','#ed2f52','#efc023')
labels=c("A","B","C","D")
pie3D(bank, labels=labels, explode=0.1, height=0.05, main='Genbank 3D
Piechart', col=colors)
```

**Genbank 3D Piechart**




b. Use the file "gapminder.csv" from the course website and read this into R. You're then required to perform the following analysis:

```
data_set<-read.csv("gapminder.csv")
str(data_set)

## 'data.frame':    1704 obs. of  6 variables:
##  $ country  : chr  "Afghanistan" "Afghanistan" "Afghanistan" "Afghanistan"
...
##  $ continent: chr  "Asia" "Asia" "Asia" "Asia" ...
##  $ year     : int  1952 1957 1962 1967 1972 1977 1982 1987 1992 1997 ...
##  $ lifeExp  : num  28.8 30.3 32 34 36.1 ...
##  $ pop      : int  8425333 9240934 10267083 11537966 13079460 14880372
12881816 13867957 16317921 22227415 ...
##  $ gdpPercap: num  779 821 853 836 740 ...

head(data_set)

##       country continent year lifeExp      pop gdpPercap
## 1 Afghanistan      Asia 1952  28.801  8425333  779.4453
## 2 Afghanistan      Asia 1957  30.332  9240934  820.8530
## 3 Afghanistan      Asia 1962  31.997 10267083  853.1007
## 4 Afghanistan      Asia 1967  34.020 11537966  836.1971
## 5 Afghanistan      Asia 1972  36.088 13079460  739.9811
## 6 Afghanistan      Asia 1977  38.438 14880372  786.1134
```

c. Obtain data set for only the year 1982

```
data_1982<- subset(data_set,subset = year==1982)
head(data_1982)
```

```
##        country continent year lifeExp      pop  gdpPercap
## 7  Afghanistan      Asia 1982  39.854 12881816   978.0114
## 19     Albania    Europe 1982  70.420  2780097  3630.8807
## 31     Algeria    Africa 1982  61.368 20033753  5745.1602
## 43      Angola    Africa 1982  39.942  7016384  2756.9537
## 55   Argentina  Americas 1982  69.942 29341374  8997.8974
## 67   Australia   Oceania 1982  74.740 15184200 19477.0093
```

```
str(data_1982)
```

```
## 'data.frame':    142 obs. of  6 variables:
##  $ country  : chr  "Afghanistan" "Albania" "Algeria" "Angola" ...
##  $ continent: chr  "Asia" "Europe" "Africa" "Africa" ...
##  $ year     : int  1982 1982 1982 1982 1982 1982 1982 1982 1982 1982 ...
##  $ lifeExp  : num  39.9 70.4 61.4 39.9 69.9 ...
##  $ pop      : int  12881816 2780097 20033753 7016384 29341374 15184200
7574613 377967 93074406 9856303 ...
##  $ gdpPercap: num  978 3631 5745 2757 8998 ...
```

d. Obtain data set for the American countries in 1997

```
data_America<-subset(data_set,continent == "Americas"& year==1997)
head(data_America)
```

```
##       country continent year lifeExp       pop gdpPercap
## 58  Argentina  Americas 1997  73.275  36203463 10967.282
## 142   Bolivia  Americas 1997  62.050   7693188  3326.143
## 178    Brazil  Americas 1997  69.388 168546719  7957.981
## 250    Canada  Americas 1997  78.610  30305843 28954.926
## 286     Chile  Americas 1997  75.816  14599929 10118.053
## 310  Colombia  Americas 1997  70.313  37657830  6117.362
```

e. Add a column to the data set loaded in R with the new column being gdp which is computed as gdp=popgdpPercap*

```
attach(data_set)
GDP<-function(pop,gdpPercap){pop*gdpPercap}
gdp<-GDP(pop,gdpPercap)
head(gdp)
```

```
## [1]  6567086330  7585448670  8758855797  9648014150  9678553274
11697659231
```

```
data_set_1<- cbind(data_set,gdp)
str(data_set_1)
```

```
## 'data.frame':    1704 obs. of  7 variables:
##  $ country  : chr  "Afghanistan" "Afghanistan" "Afghanistan" "Afghanistan"
...
##  $ continent: chr  "Asia" "Asia" "Asia" "Asia" ...
##  $ year     : int  1952 1957 1962 1967 1972 1977 1982 1987 1992 1997 ...
##  $ lifeExp  : num  28.8 30.3 32 34 36.1 ...
##  $ pop      : int  8425333 9240934 10267083 11537966 13079460 14880372
```

```
12881816 13867957 16317921 22227415 ...
##  $ gdpPercap: num  779 821 853 836 740 ...
##  $ gdp      : num  6.57e+09 7.59e+09 8.76e+09 9.65e+09 9.68e+09 ...
```