case_study_2

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April 21, 2017

Question 1

SAS code:

```
proc iml;
reset print;
A={4 5 1 2, 1 0 3 5, 2 1 8 2};
quit;
```

Output:

A 3 rows 4 cols (numeric)

4 5 1 2 1 0 3 5 2 1 8 2

R code:

```
mymat = matrix(c(4,5,1,2,1,0,3,5,2,1,8,2), ncol = 4, byrow = TRUE)
mymat
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    4    5    1    2
## [2,]    1    0    3    5
## [3,]    2    1    8    2
```

Python Code:

```
import numpy as np
a = np.matrix('4 5 1 2; 1 0 3 5; 2 1 8 2')
print(a)
```

```
## [[4 5 1 2]
##  [1 0 3 5]
##  [2 1 8 2]]
```

Question 2

```
#install.packages("tseries")
library(tseries)
XOMData <- get.hist.quote("xom", quote = "Close")
```

```
## time series ends   2017-04-21
```

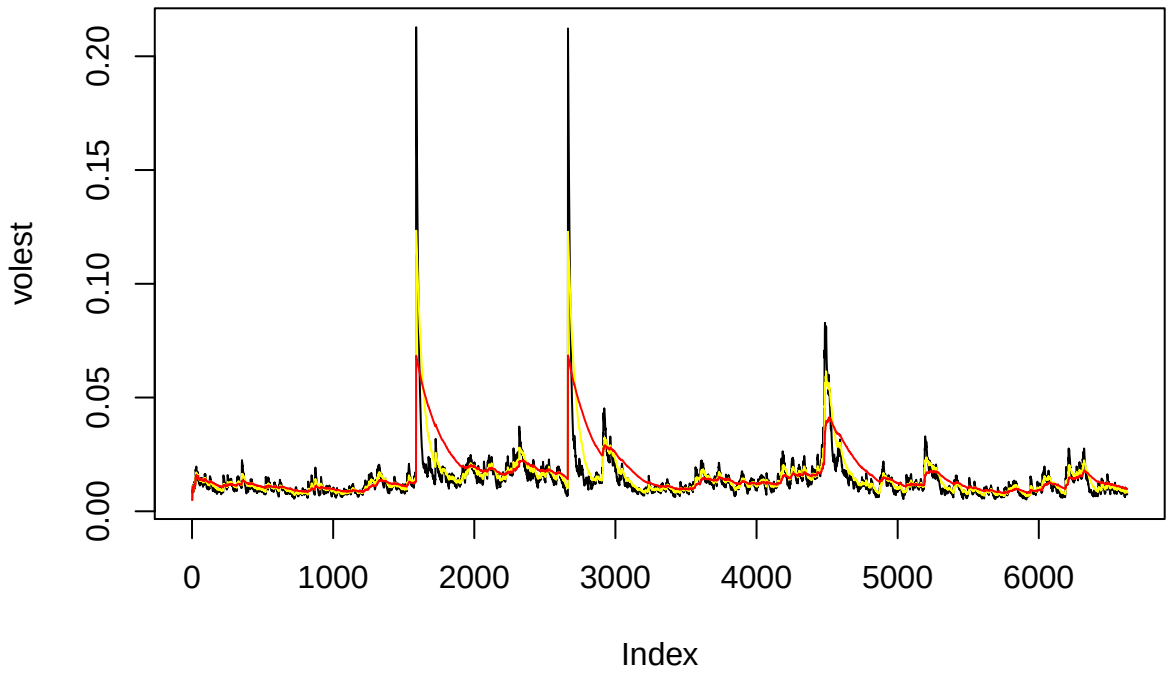
```r
XOMret <- log(lag(XOMData)) - log(XOMData)

XOMVol <- sd(XOMret) * sqrt(250)* 100

## volatility get
getVol <- function(d, logrets) {
      var = 0
      lam = 0
      varlist <- c()
      for (r in logrets) {
        if (! is.na(r)) {
          lam = lam*(1-1/d)+1
          var=(1-1/lam)*var+(1/lam)*r^2
          varlist <- c(varlist, var)
        }
      }
      sqrt(varlist)
}

volest <- getVol(10,XOMret)
volest2 <- getVol(30,XOMret)
volest3 <- getVol(100,XOMret)

plot(volest, type="l")
lines(volest2, type="l", col="yellow")
lines(volest3, type="l", col="Red")
```



Question 3

a

```
#install.packages("dplyr")
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

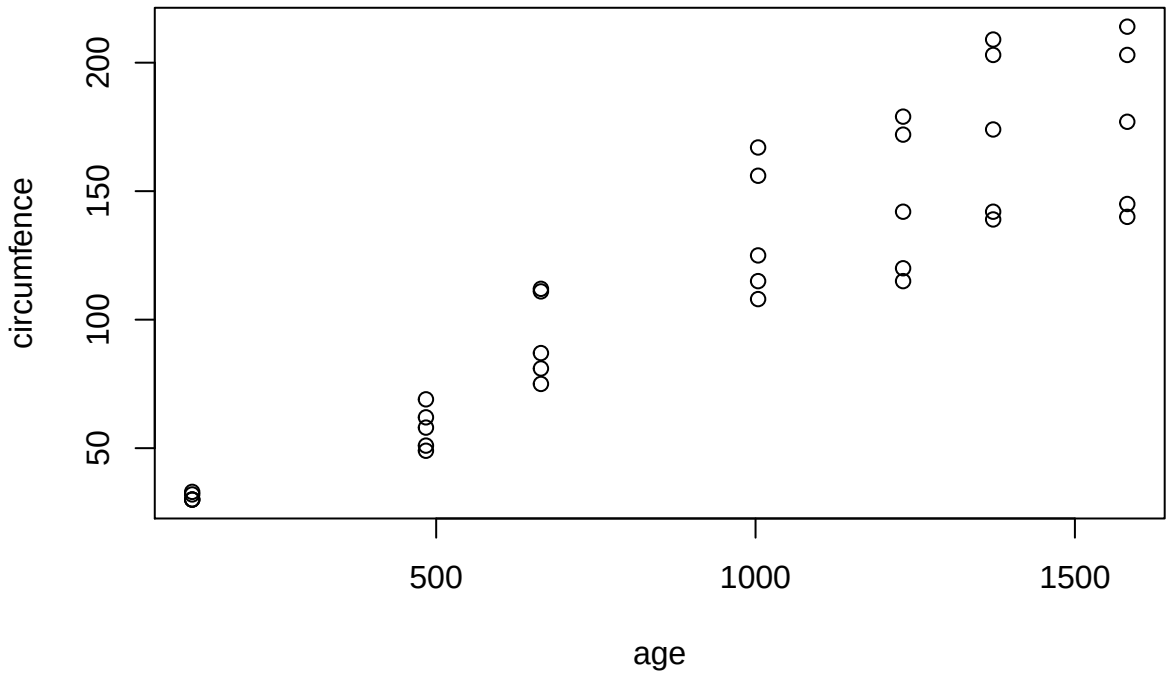
```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
orange_grouped <- group_by(Orange, Tree)
summarise(orange_grouped, mean=mean(circumference), median=median(circumference))
```

```
## # A tibble: 5 × 3
##    Tree      mean median
##   <ord>     <dbl>  <dbl>
## 1     3  94.00000    108
## 2     1  99.57143    115
## 3     5 111.14286    125
## 4     2 135.28571    156
## 5     4 139.28571    167
```

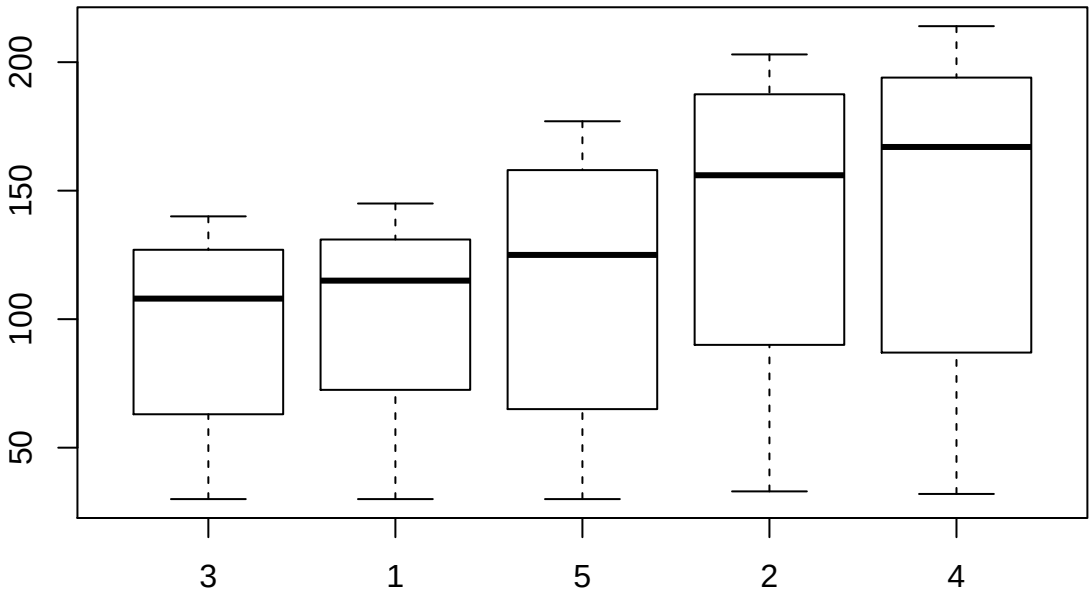
b

```
plot(Orange$age, Orange$circumference, xlab="age", ylab = "circumfence")
```



c

```
boxplot(Orange$circumference ~ Orange$Tree)
```



Question 05

```
t<-seq(0,10,length=1000)
x<-sqrt(t)*cos(2*pi*t)
y<-sqrt(t)*sin(2*pi*t)
plot(x,y,axes=F,type="l",lwd=3,xlab="x(t)",ylab="y(t)",col="red")
axis(1,at=seq(-3,3,by=0.5),labels=seq(-3,3,by=0.5))
axis(2)
box()
```

```
title(main=expression(
paste("(x(t),y(t)) with polar coordinates", (list(sqrt(t),2*pi*t))
)))
```