Homework 4

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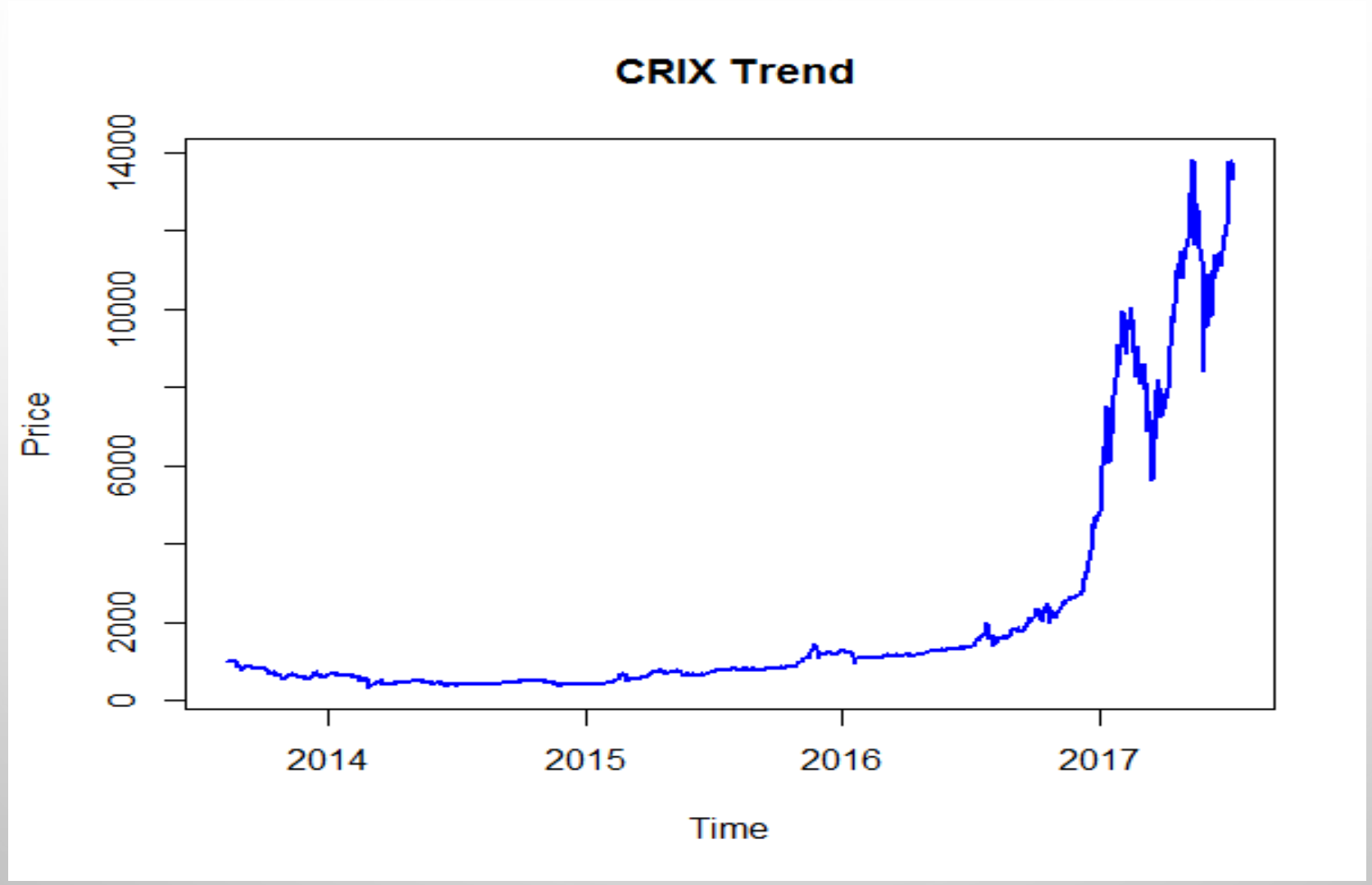
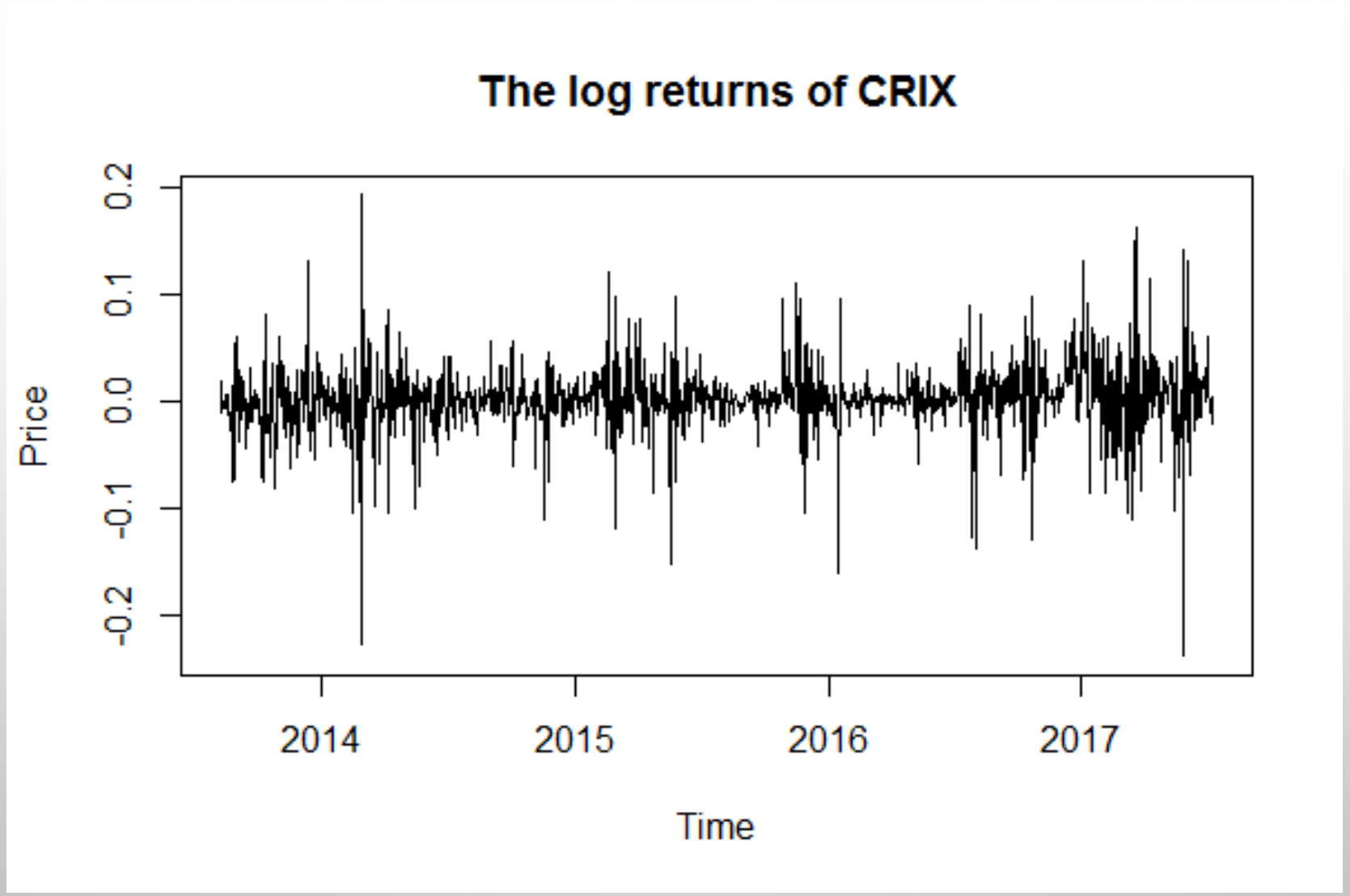
Question 1

R Codes:

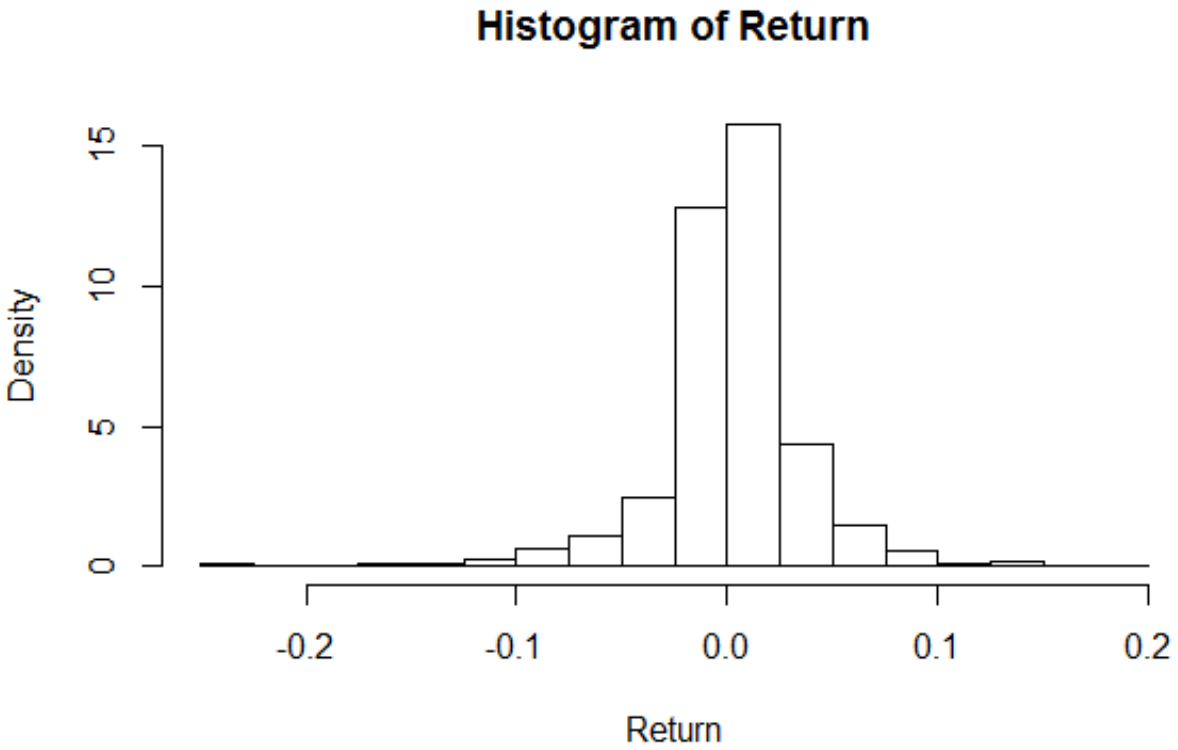
```
# figure 3 #

plot(price, type = "l", lwd = 2, col = "blue",
xaxt='n',xlab="Time",ylab = "Price", main = " CRIX Trend")

axis(1,c(120,420,720,1020),c("2014","2015","2016","2017"))
```


CRIX Trend
Price
0
2000
6000
10000
14000
2014
2015
2016
2017
Time

```
# figure 4 #

plot(Return, type = "l", xaxt='n',xlab="Time",ylab = "Price",
main = "The log returns of CRIX")

axis(1,c(120,420,720,1020),c("2014","2015","2016","2017"))
```


The log returns of CRIX
Price
0.2
0.1
0.0
-0.1
-0.2
2014
2015
2016
2017
Time

```
# figure 5 #
hist(Return,freq=FALSE,breaks = seq(-0.25,0.2,by=0.025))
#lines(density(Return),col="blue",lwd=2)
qqnorm(Return)
qqline(Return,col="blue",lwd=2)# figure 6 #
```


Histogram of Return
Density
0
5
10
15
-0.2
-0.1
0.0
0.1
0.2
Return

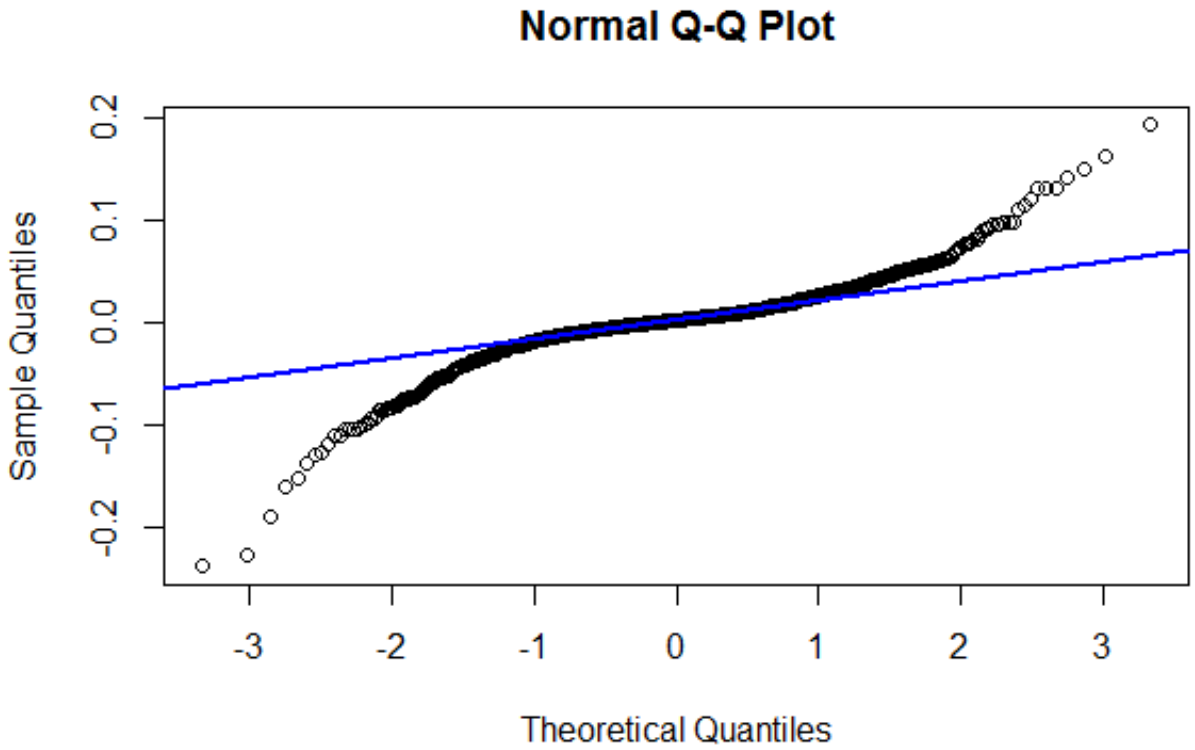
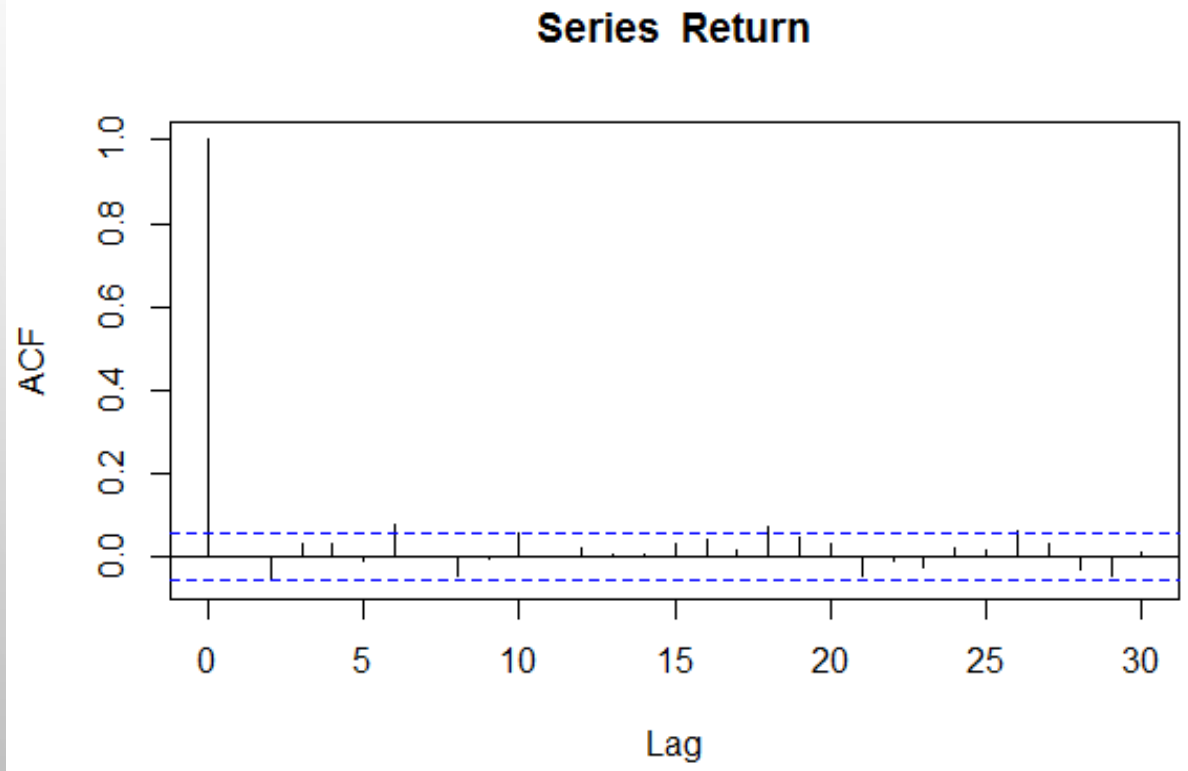
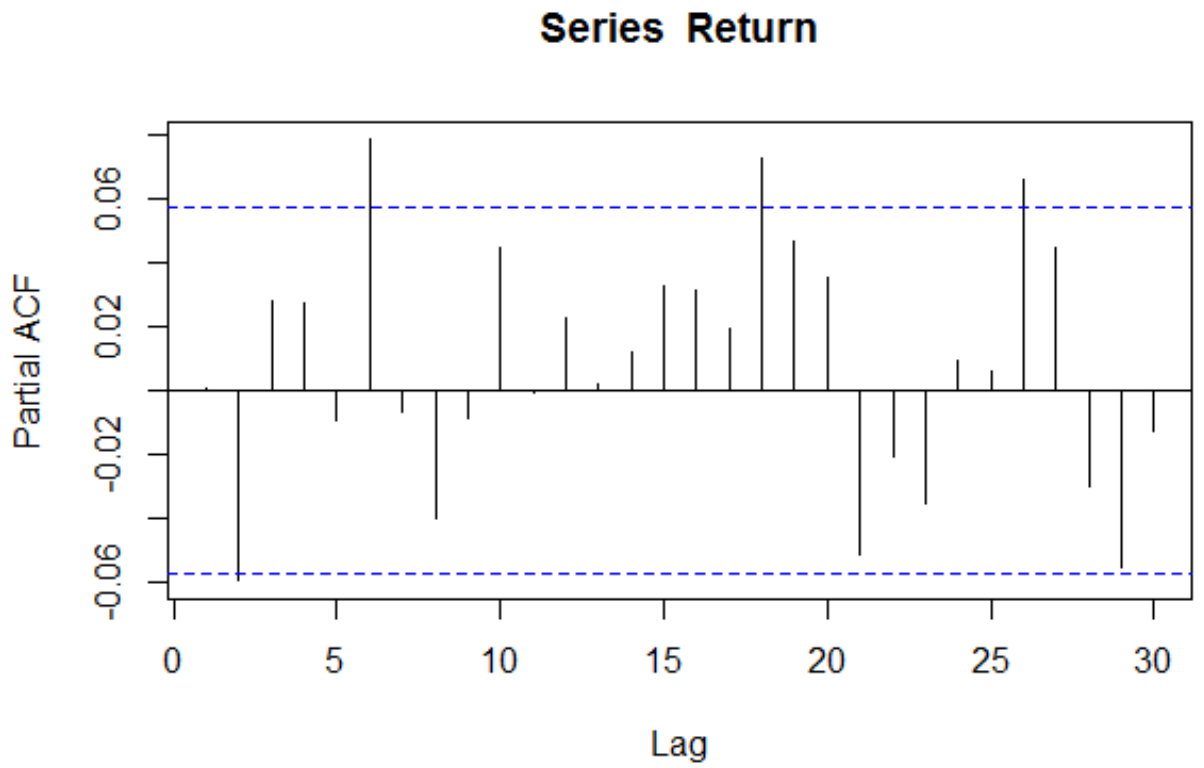

Normal Q-Q Plot
Sample Quantiles
-0.2
-0.1
0.0
0.1
0.2
-3
-2
-1
0
1
2
3
Theoretical Quantiles

figure 6

acf(Return)

pacf(Return)

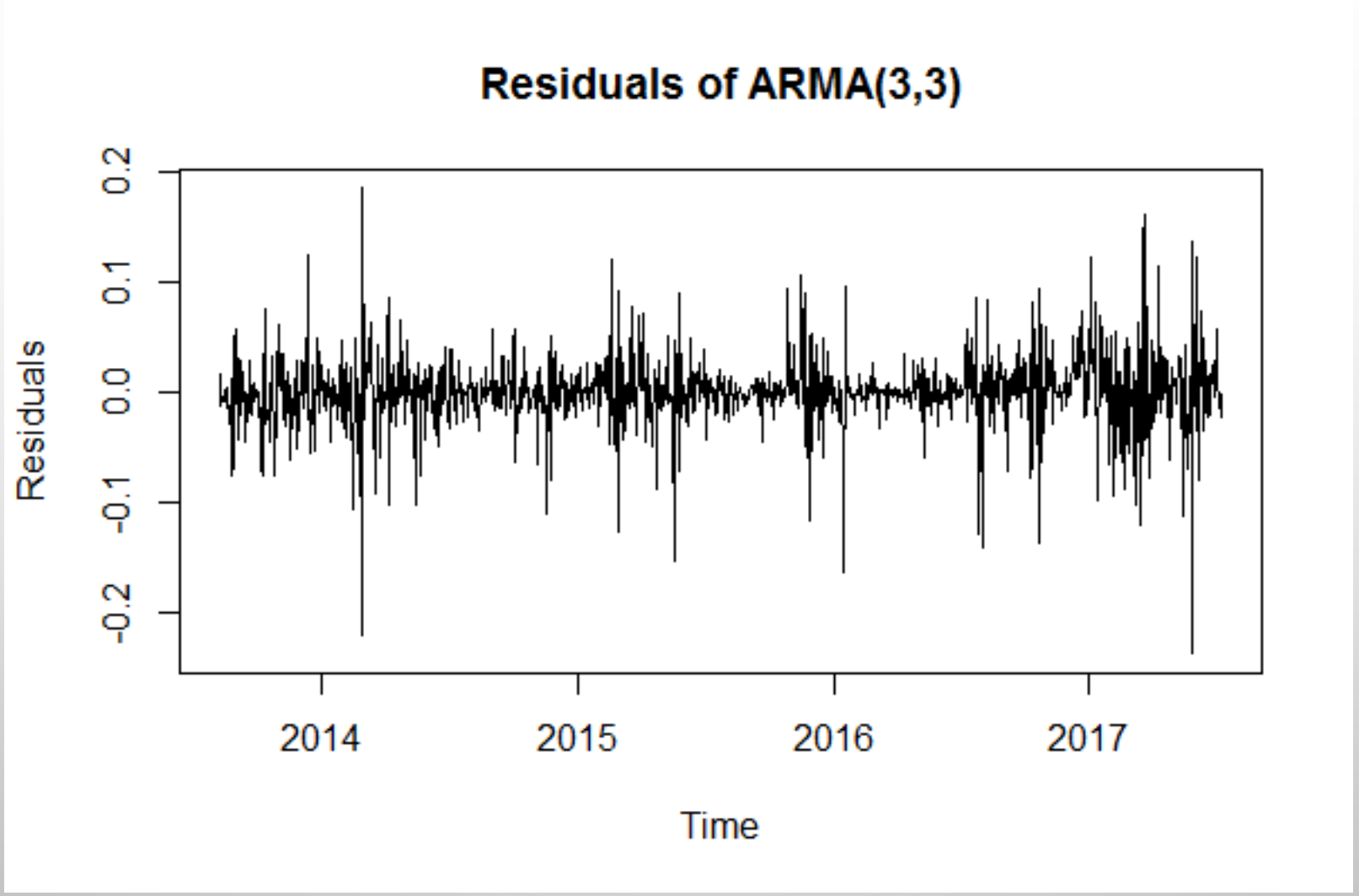

Series Return
ACF
0.0
0.2
0.4
0.6
0.8
1.0
0
5
10
15
20
25
30
Lag

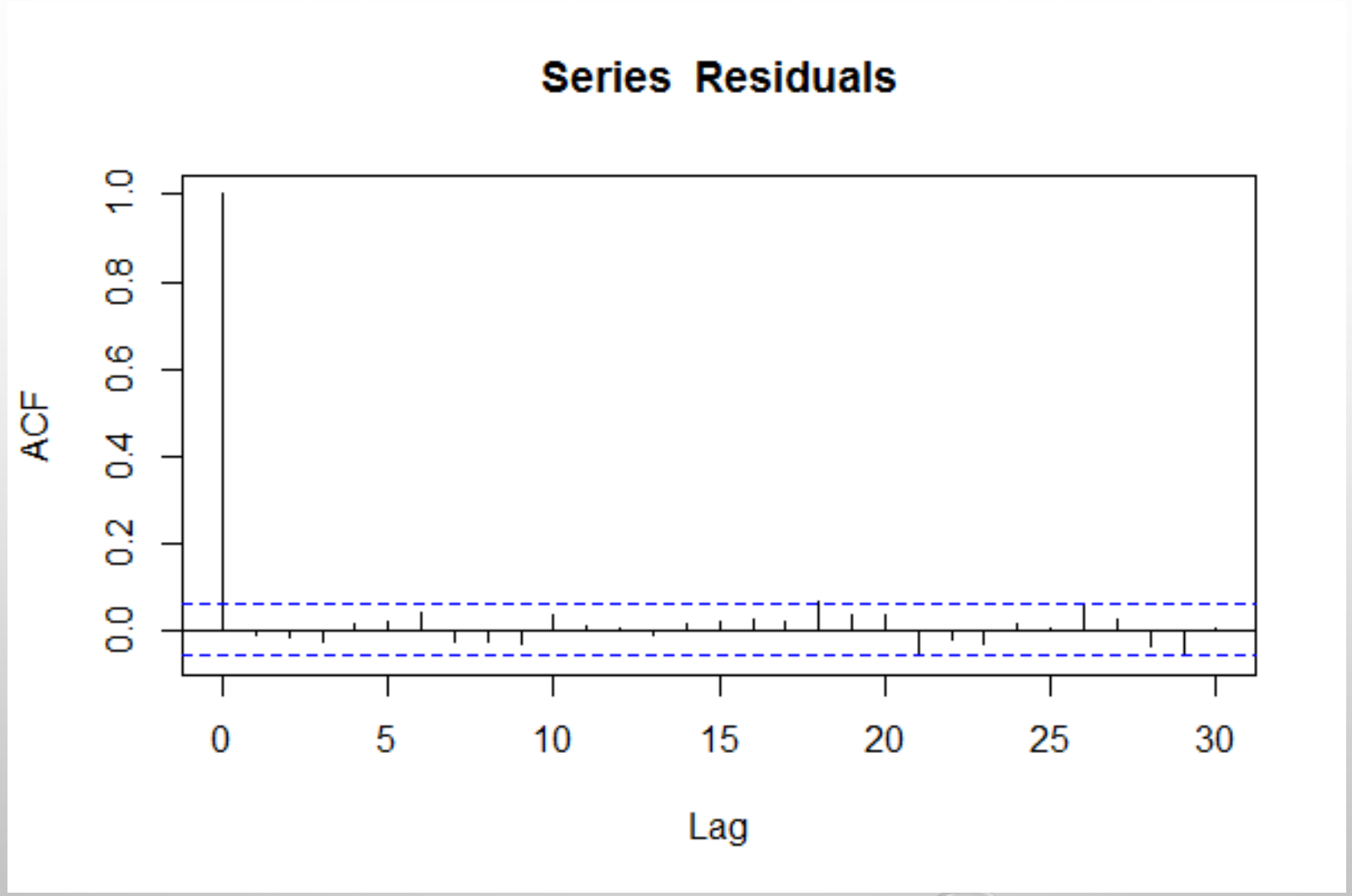

Series Return
Partial ACF
-0.06
-0.02
0.02
0.06
0
5
10
15
20
25
30
Lag

Question 2

R codes:

```
# select p and q order of ARIMA model

fit1 = arima(ret, order = c(3, 0, 3))

plot(fit1$residuals, xaxt='n',ylab="Residuals", main="Residuals of ARMA(3,3)")

axis(1,c(120,420,720,1020),c("2014","2015","2016","2017"))

Box.test(fit1$residuals, lag = 1)

Residuals <- fit1$residuals

acf(Residuals)
```


Residuals of ARMA(3,3)
Residuals
0.2
0.1
0.0
-0.1
-0.2
2014
2015
2016
2017
Time


Series Residuals
ACF
0.0
0.2
0.4
0.6
0.8
1.0
0
5
10
15
20
25
30
Lag