Assignment 1 (ARIMA/SARIMA)

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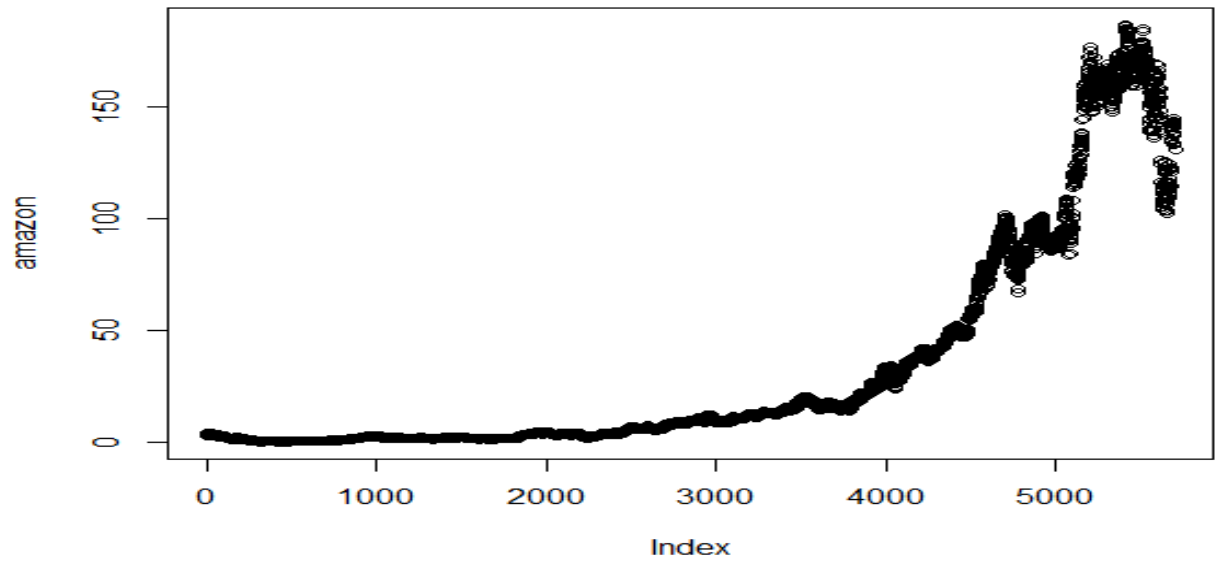
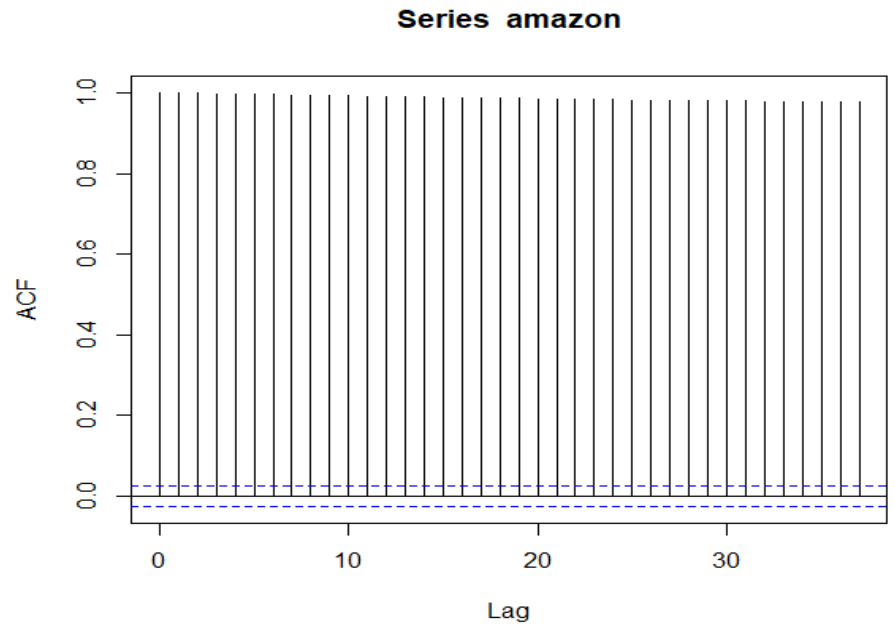
We have the data for amazon stock for the past 19 years and we have run the arima and sarima model to predict the values for upcoming 10 days

#first load the data into the R environment

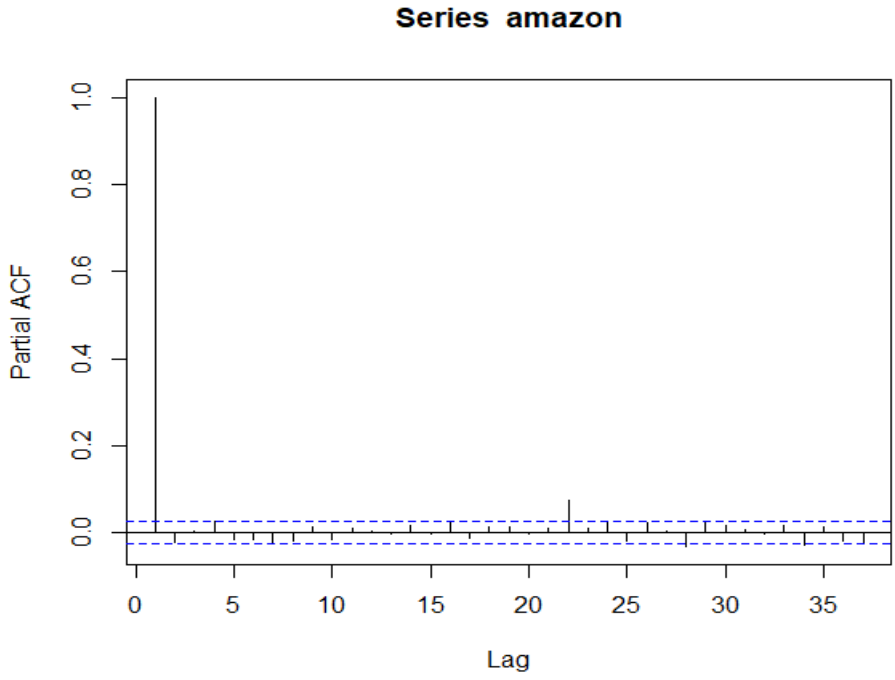
```
library(readxl)
amazon_stocks <- read_excel("amazon_stocks.xlsx")
View(amazon_stocks)

#attach the file
attach(amazon_stocks)
#ploting the graph for the stock values at the end of the day
plot(amazon)
```




```
#performing the acf and pacf to find out the order of the AR and MA into the data
acf(amazon)
```



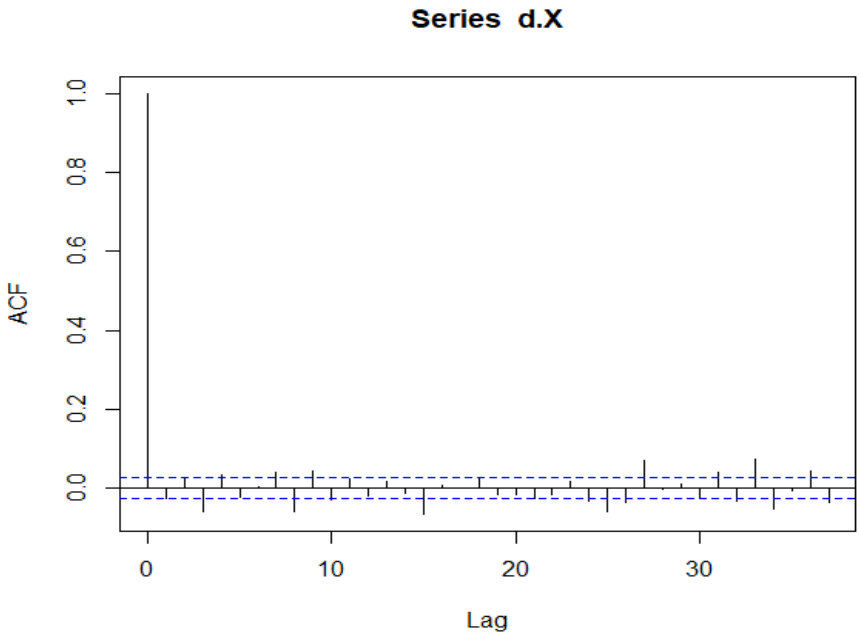
#from the acf graph we are not getting any significant order for MA
pacf(amazon)



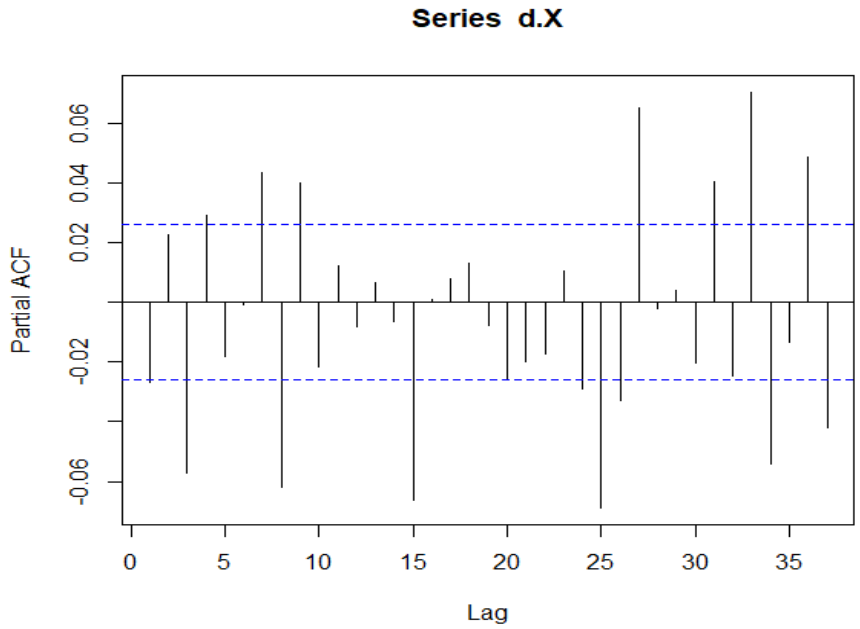
#from this we get a significant order of AR that is 1.
#so we have to do the differentiation of the data

#Differentiating to get the data stationary
d.X<-diff(amazon)

acf(d.X)

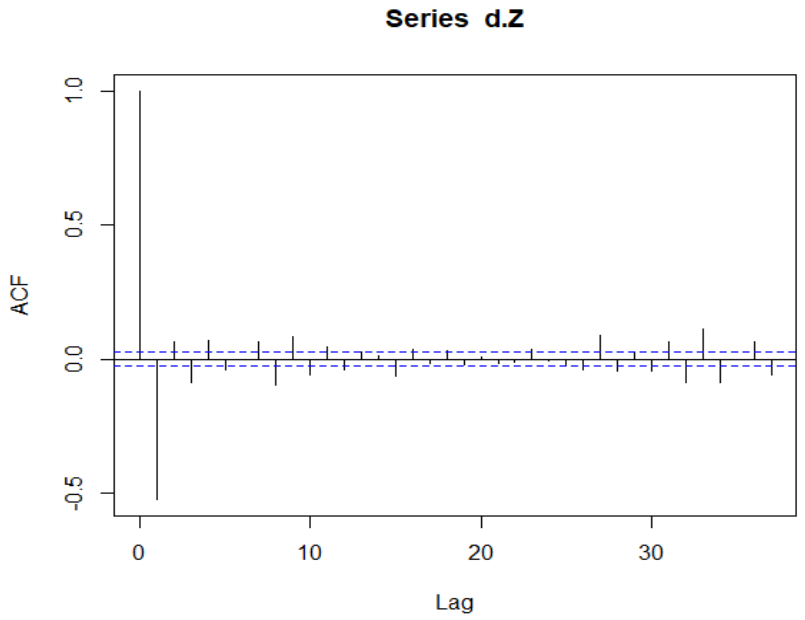


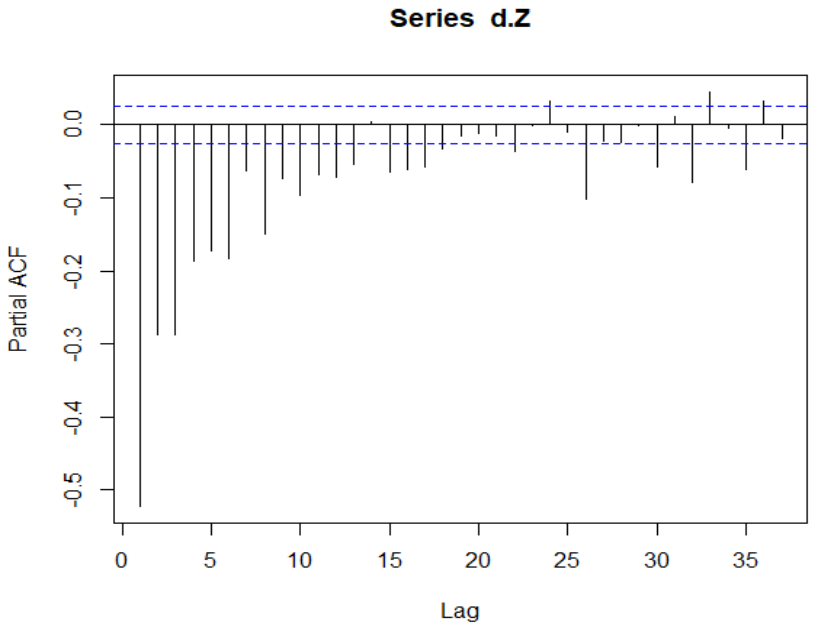
#from the acf graph we get significant order for MA as 1
pacf(d.X)



#from this we didn't get a significant order of AR.
#Double Differentiating
d.Z<-diff(d.X)

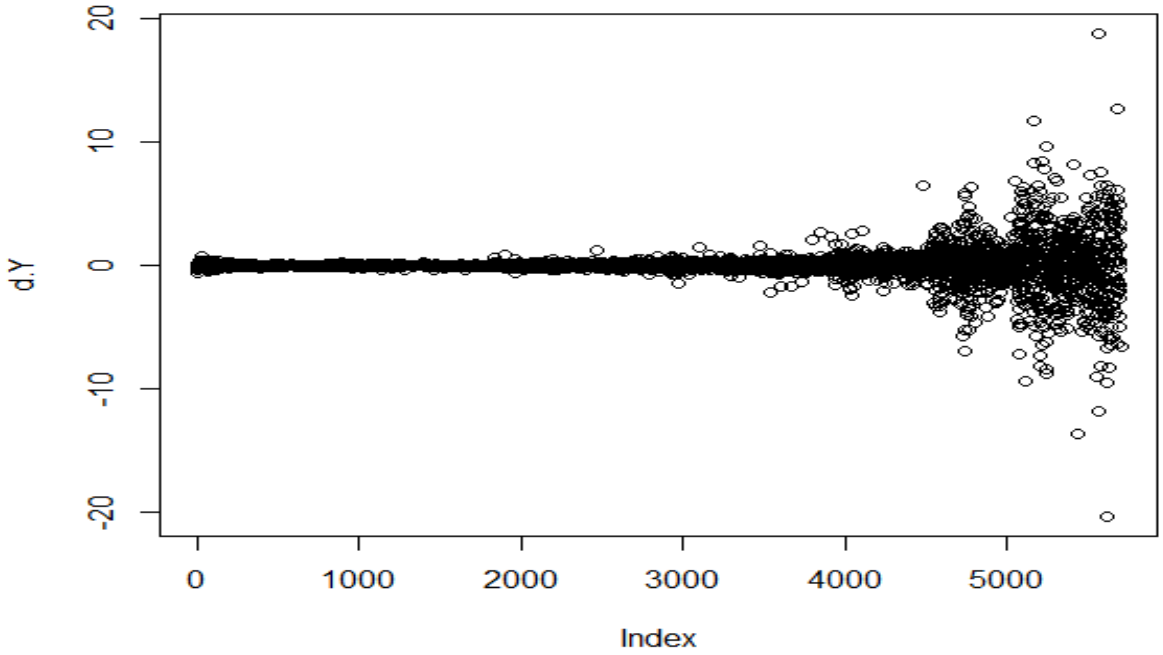
acf(d.Z)
pacf(d.Z)



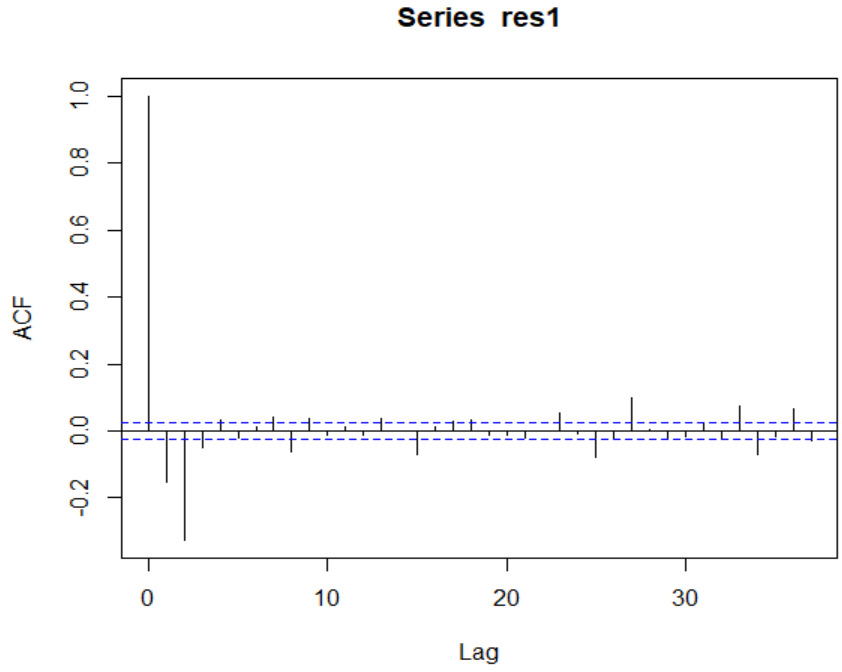


#now we get the significant value for both AR and MA as 1 and 1 respectively.

#Estimation and Diagnosis
attach(amazon_stocks)
d.Y<-diff(amazon)
plot(d.Y)




```
fit<-arima(d.Y,order=c(1,2,1))
res1<-fit$residuals
acf(res1)
```



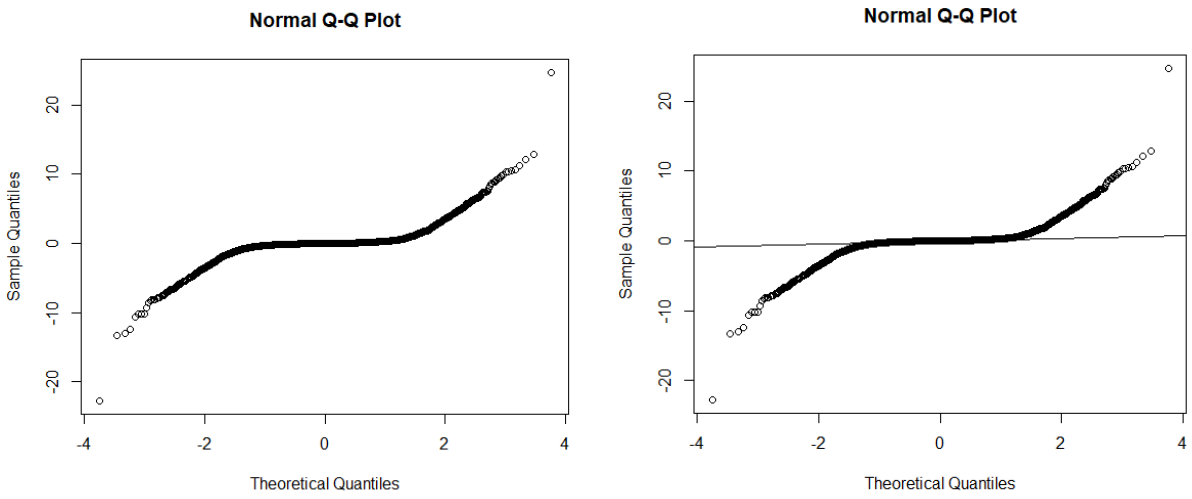

```
Box.test(res1,lag=2,type="Ljung")
shapiro.test(res1)
```

```
        Shapiro-Wilk normality test

data:  res1
W = 0.63882, p-value < 2.2e-16
```

#p- value is significant

qqnorm(res1)

qqline(res1)



#prediction 20 values using the previous data without checking the seasonality

arima1<-arima(amazon,order=c(1,2,1))

arima1

predict(arima1,n.ahead=20)

```
Call:
arima(x = amazon, order = c(1, 2, 1))

Coefficients:
          ar1      ma1
      -0.0274  -0.9998
s.e.   0.0146   0.0012

sigma^2 estimated as 1.9:  log likelihood = -8170.91,  aic = 16347.83
> predict(arima1,n.ahead=20)
$pred
Time Series:
Start = 4697
End = 4716
Frequency = 1
 [1] 130.9583 130.9821 131.0110 131.0397 131.0684 131.0971 131.1258 131.1545 131.1833 131.2120
[11] 131.2407 131.2694 131.2981 131.3268 131.3555 131.3843 131.4130 131.4417 131.4704 131.4991

$se
Time Series:
Start = 4697
End = 4716
Frequency = 1
 [1] 1.378487 1.923211 2.345410 2.702590 3.017940 3.303459 3.566321 3.811215 4.041410 4.259290
[11] 4.466656 4.664912 4.855174 5.038347 5.215178 5.386292 5.552217 5.713406 5.870249 6.023086
```

#Loading libraries into the R environment
library(tseries)
library(fpp2)
library(urca)

#checking for seasonality
nsdiffs(amazon)

```
R 4.1.1 · C:/Users/Vinod ji/Desktop/New folder/
> #checking for seasonality
> nsdiffs(amazon)
Error in nsdiffs(amazon) : Non seasonal data
```

#Used data is not seasonal
#The given data is not seasonal but assume it to be seasonal to perform sarima and then predict 10
#values for the amazon stock
arima1<-arima(amazon,order=c(1,2,1),seasonal=c(1,2,1))
predict(arima1,n.ahead=10)

```
> predict(arima1,n.ahead=10)
$pred
Time Series:
Start = 4697
End = 4706
Frequency = 1
 [1] 130.3065 127.1847 125.2136 122.7709 120.5080 118.1725 115.8598 113.5345 111.2095 108.8802

$se
Time Series:
Start = 4697
End = 4706
Frequency = 1
 [1]  1.655184  2.767900  4.279656  5.927506  7.770963  9.767084 11.913869 14.198785 16.615345
[10] 19.156755
```

In this assignment we have used 19 years data for the amazon stock and predicted values for the next 20 days using ARIMA and then checking for the Seasonality in the data and applying the SARIMA to predict values for upcoming 10 days.