HW03_Q6_ADF_TEST

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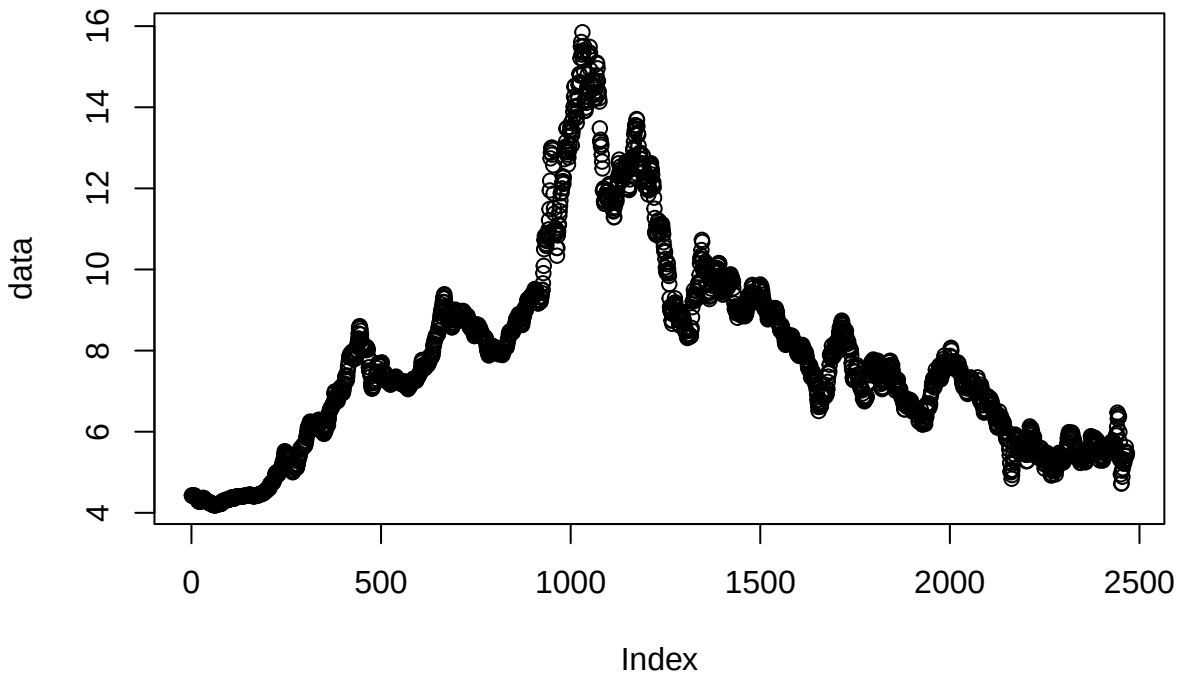
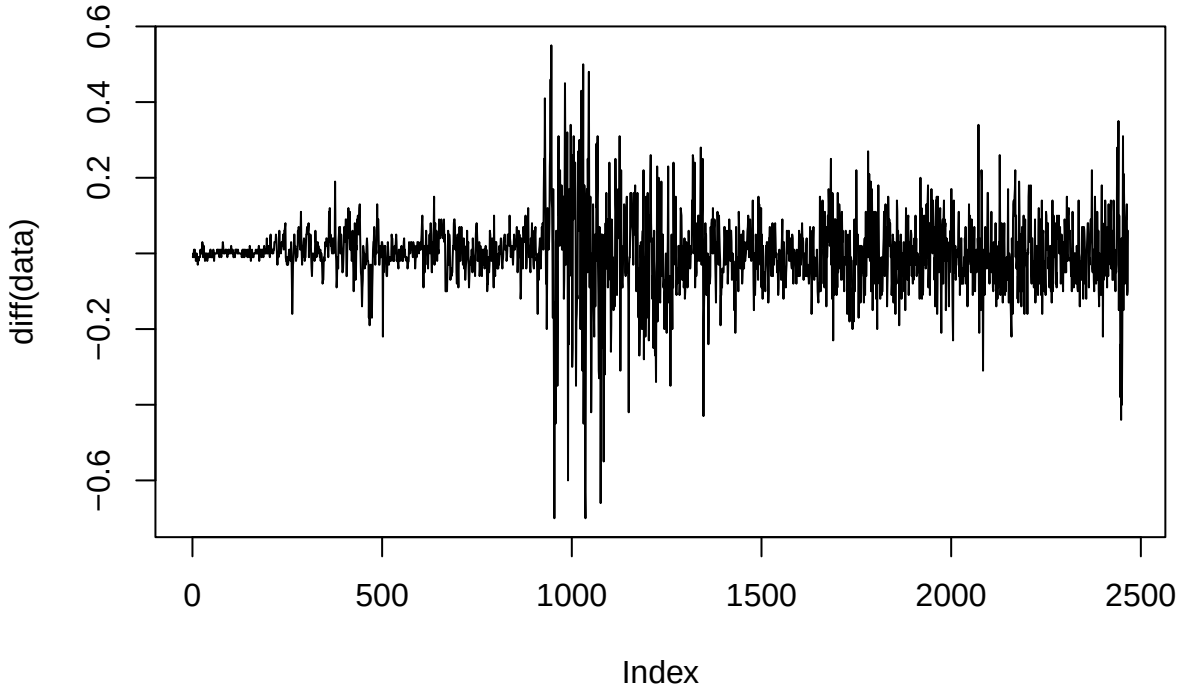
Read data

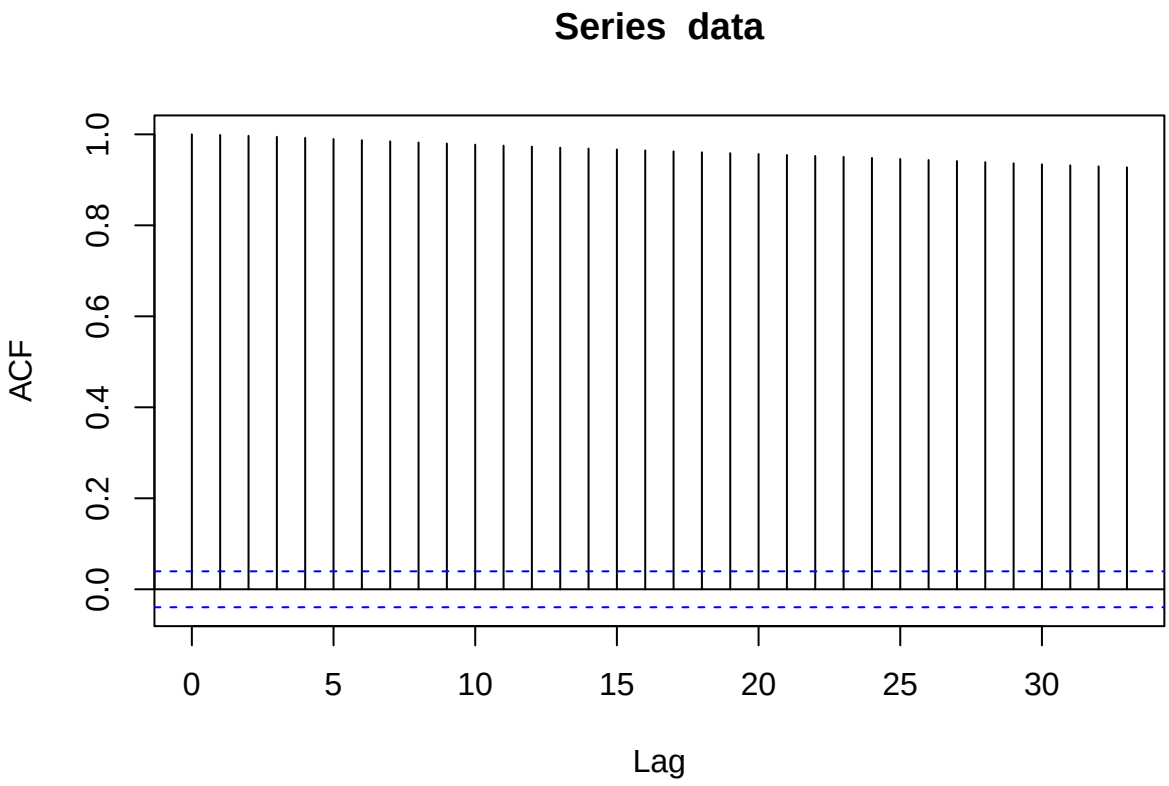
```
df=read.table("w-Aaa.txt",sep = "")

data = df$V4

plot(data)
```



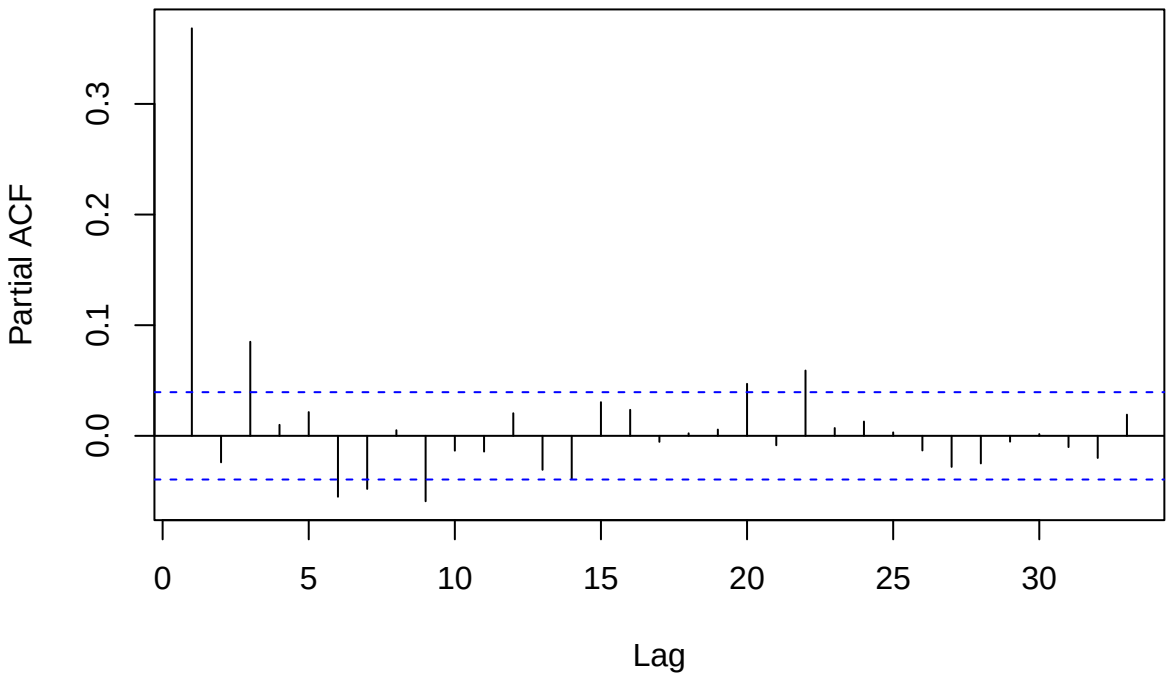

```
plot(diff(data),type="l")
```




```
acf(data)
```




```
pacf(diff(data))
```




```
adfTest(data,lags=2,type=("c"))
```

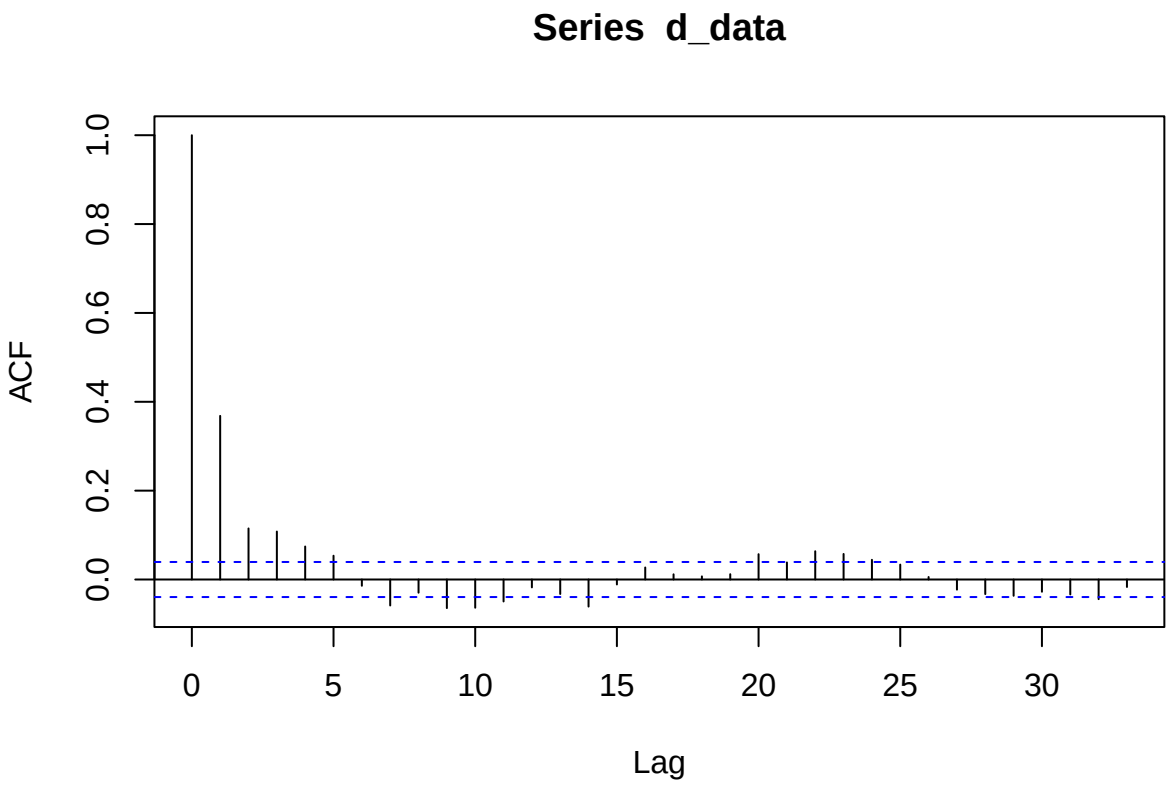
```
##
## Title:
##  Augmented Dickey-Fuller Test
##
## Test Results:
##   PARAMETER:
##     Lag Order: 2
##   STATISTIC:
##     Dickey-Fuller: -1.6133
##   P VALUE:
##     0.4577
##
## Description:
##  Tue Oct  8 23:02:07 2024 by user: kamin
```

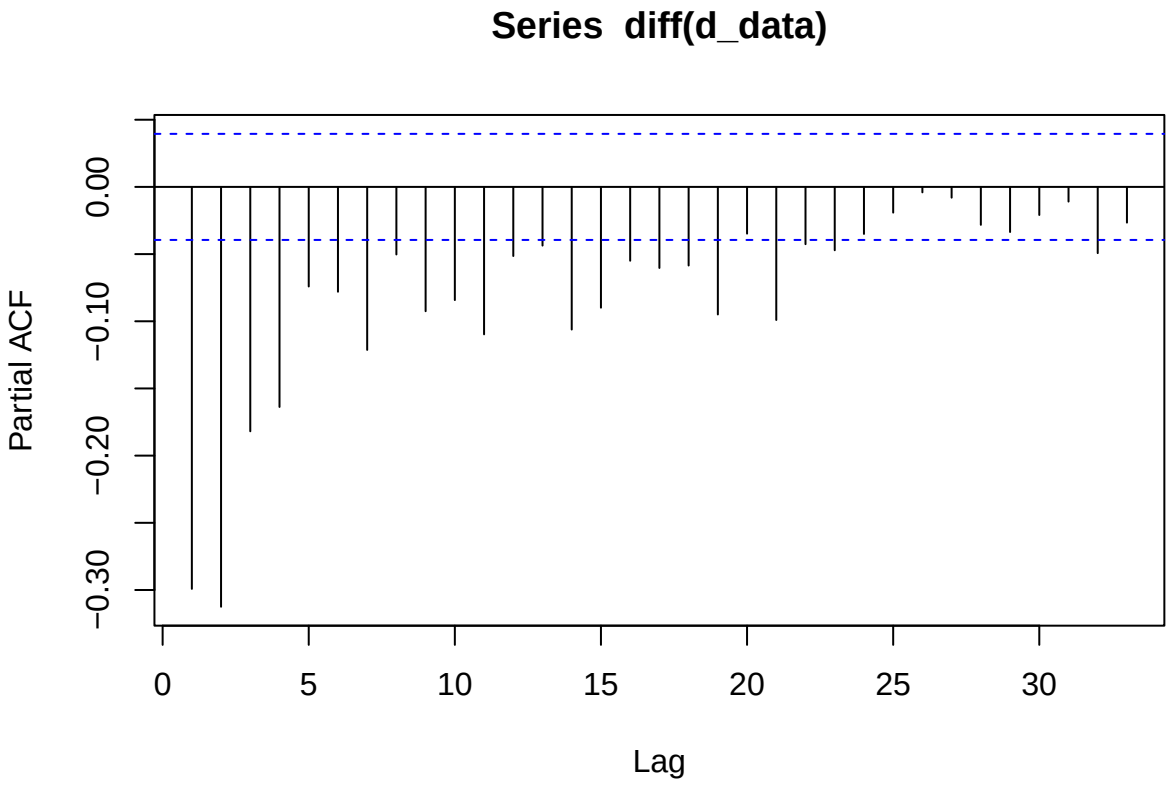
```
adfTest(data,lags=2,type=("ct"))
```

```
##
## Title:
##  Augmented Dickey-Fuller Test
##
## Test Results:
```

```
##   PARAMETER:
##     Lag Order: 2
##   STATISTIC:
##     Dickey-Fuller: -1.6337
##   P VALUE:
##     0.7334
##
## Description:
##  Tue Oct  8 23:02:07 2024 by user: kamin
```

Data after differencing



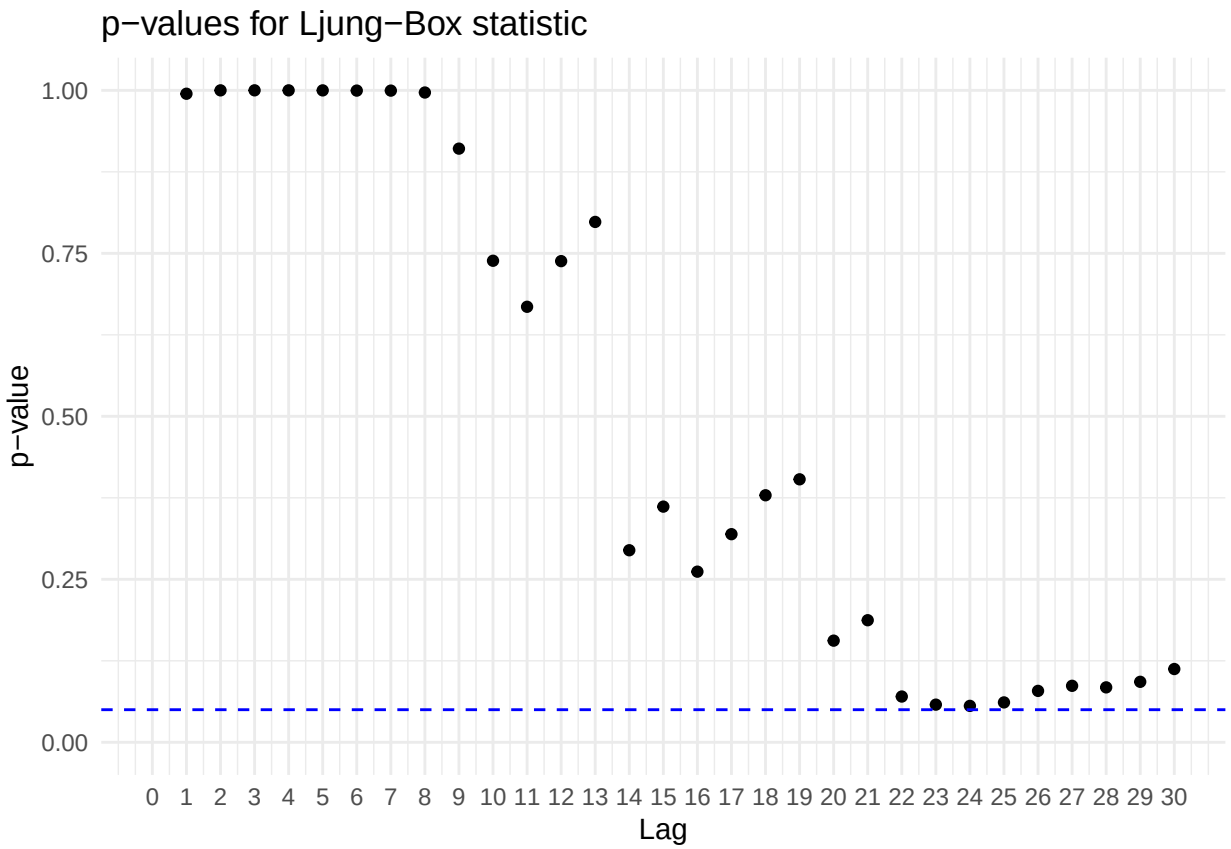


```
## Warning in adfTest(d_data, lags = 2, type = ("c")): p-value smaller than
## printed p-value

##
## Title:
##  Augmented Dickey-Fuller Test
##
## Test Results:
##   PARAMETER:
##     Lag Order: 2
##   STATISTIC:
##     Dickey-Fuller: -22.7166
##   P VALUE:
##     0.01
##
## Description:
##  Tue Oct  8 23:02:08 2024 by user: kamin

## Warning in adfTest(d_data, lags = 2, type = ("ct")): p-value smaller than
## printed p-value

##
## Title:
##  Augmented Dickey-Fuller Test
##
## Test Results:
##   PARAMETER:
##     Lag Order: 2
##   STATISTIC:
##     Dickey-Fuller: -22.7594
##   P VALUE:
##     0.01
##
## Description:
##  Tue Oct  8 23:02:08 2024 by user: kamin
```

Try different models (based on previous ACF and PACF analysis)

ARIMA(2,0,3)

```
##
## Call:
## arima(x = d_data, order = c(3, 0, 6))
##
## Coefficients:
##          ar1      ar2      ar3     ma1     ma2     ma3     ma4     ma5     ma6
##       -0.6547  -0.2398  -0.0813  1.0343  0.5754  0.3270  0.1862  0.1523  0.1024
## s.e.   0.2057   0.2467   0.2003  0.2046  0.2783  0.2629  0.0885  0.0388  0.0247
##       intercept
##          0.0005
## s.e.     0.0031
##
## sigma^2 estimated as 0.007955:  log likelihood = 2461.03,  aic = -4900.06
```


p−values for Ljung−Box statistic
p−value
1.00
0.75
0.50
0.25
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Lag