PSTAT 174 Lab 6

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** 1 **

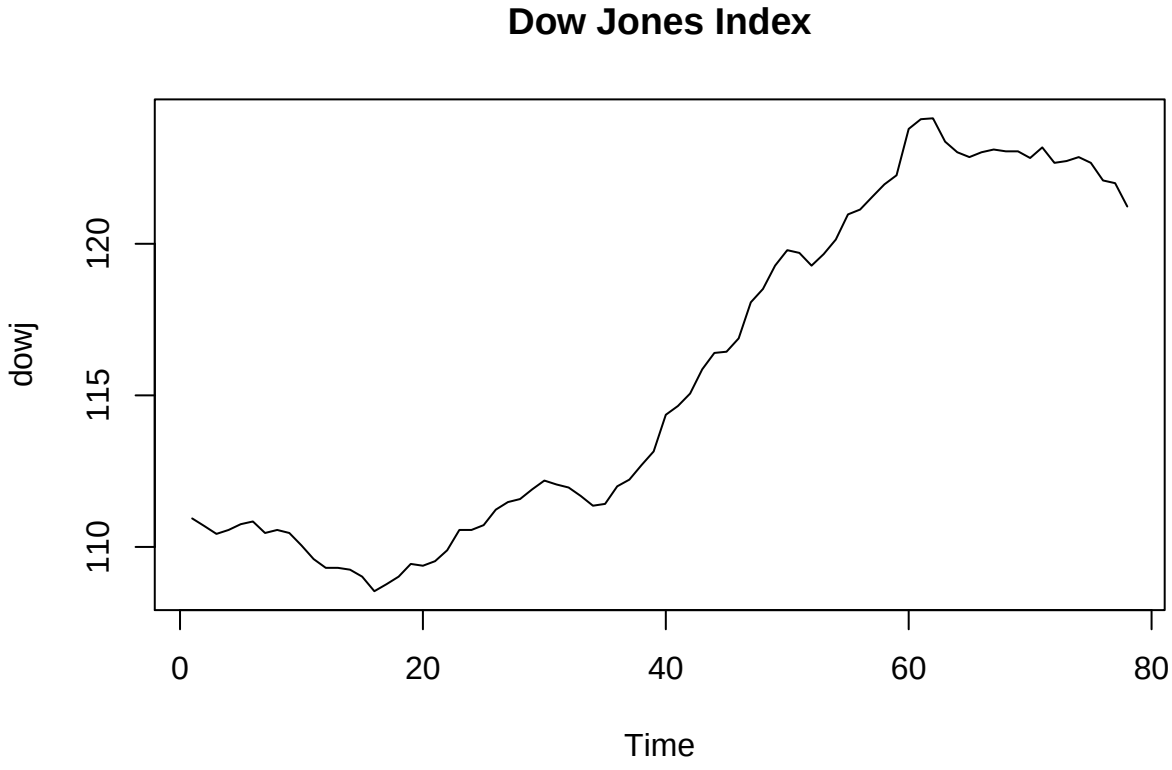
(a) Summarize how you would carry out the following steps in time series analysis. You can describe briefly by words, or write down R commands you would use to implement these steps

• Step 1 Data processing (make the data stationary) To remove trend take lag at 1, to remove seasonality take lag at 12. Do this until the data doesn't have trend or seasonality. • Step 2 Model identification: Analyze the acf and pacf for patterns or shocks, use these to estimate the p,d,q and/or P,D,Q values. So these are your potential models. • Step 3 Model estimation Use Yule-Walker and MLE and AICc estimates • Step 4 Model selection Select the best fit model by fitting using the potential models, calculate the coffecients and variance. • Step 5 Model diagnostics Test for roots to see if it is causal/invertible Test for residuals for independence • Step 6 Data forecast Test confidence intervals for forecasting

(b) Review this week's lab material, Dow Jones Index question part 3) ('Make the data stationary'). Is differencing once at lag 1 sufficient to make the data stationary? If yes, justify it. If no, try to make it stationary. Please write related R Codes. Yes, differencing once at lag 1 is sufficient since it got rid of the upward trend. If the data had a quadratic trend then we would difference twice. After the data has been differenced the plot is stationary, meaning there are no trends or seasonality.

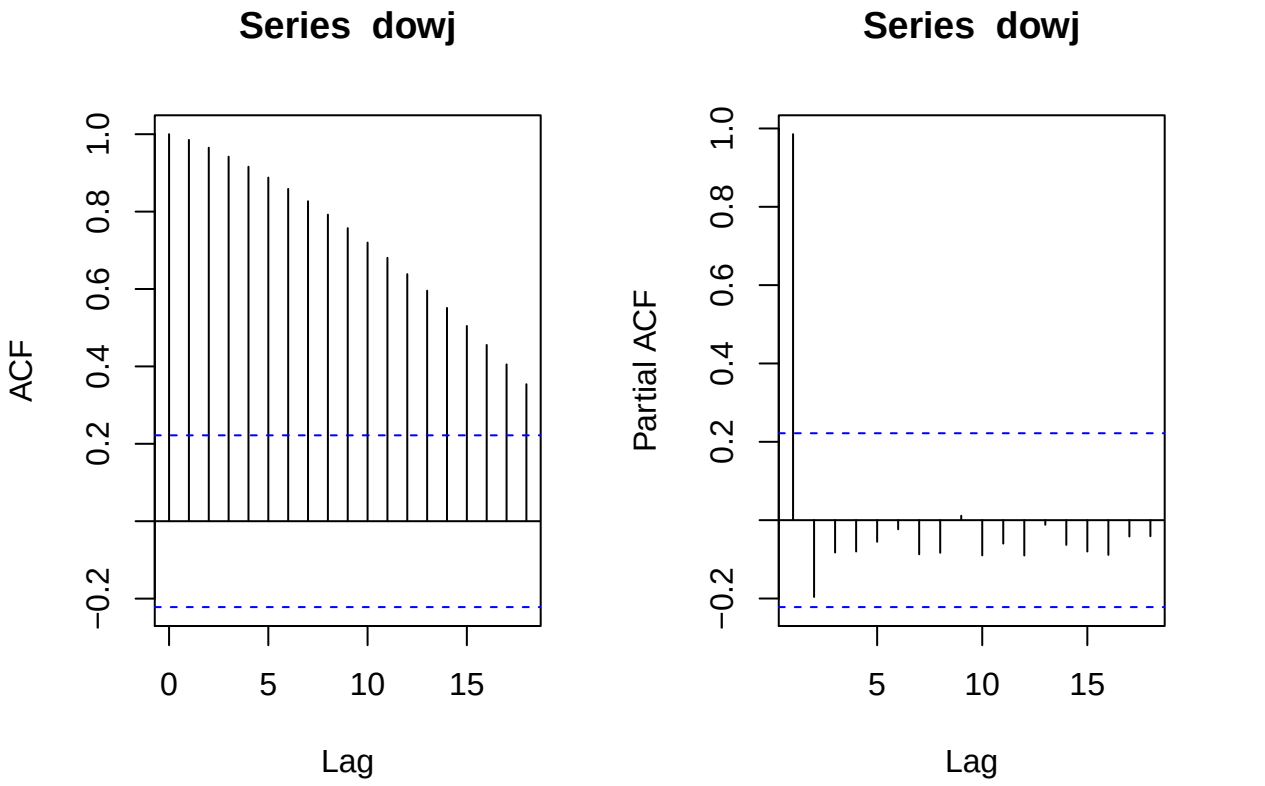
```
# Load data
dowj_data <- scan("dowj.txt")

dowj <- ts(dowj_data)
# Plot data
ts.plot(dowj,main = "Dow Jones Index")
```

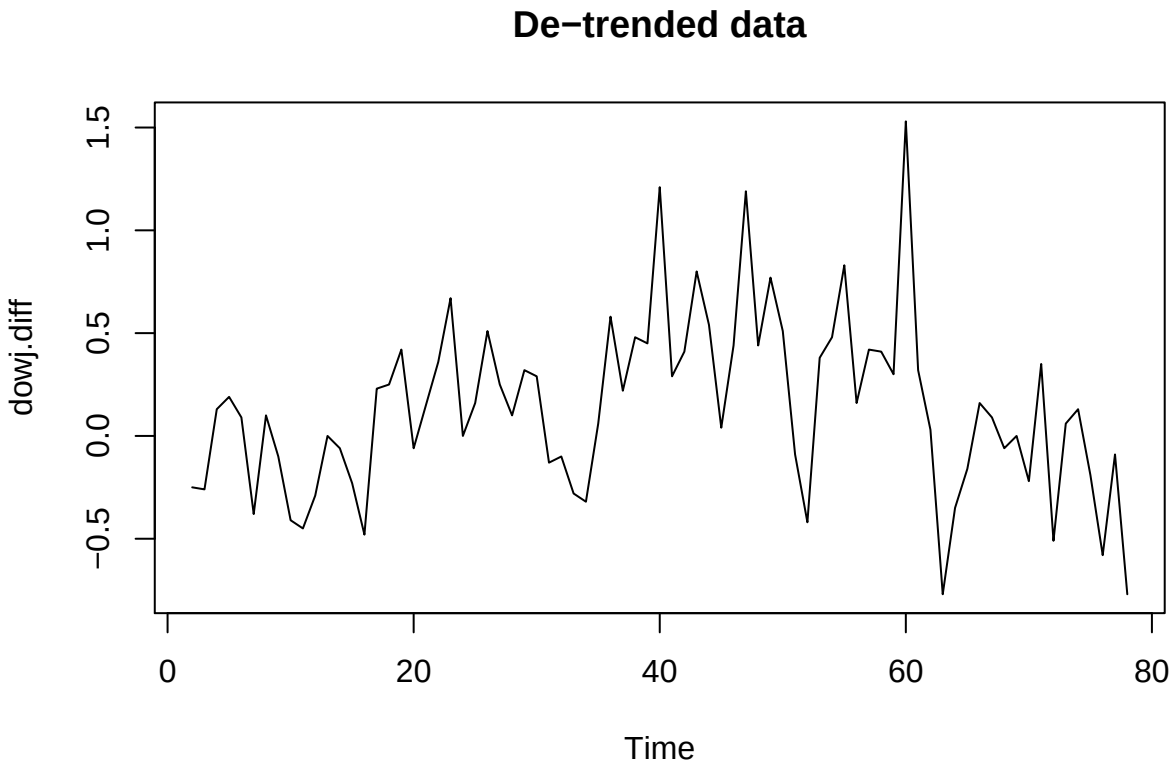



```
op <- par(mfrow=c(1,2))
acf(dowj)
```

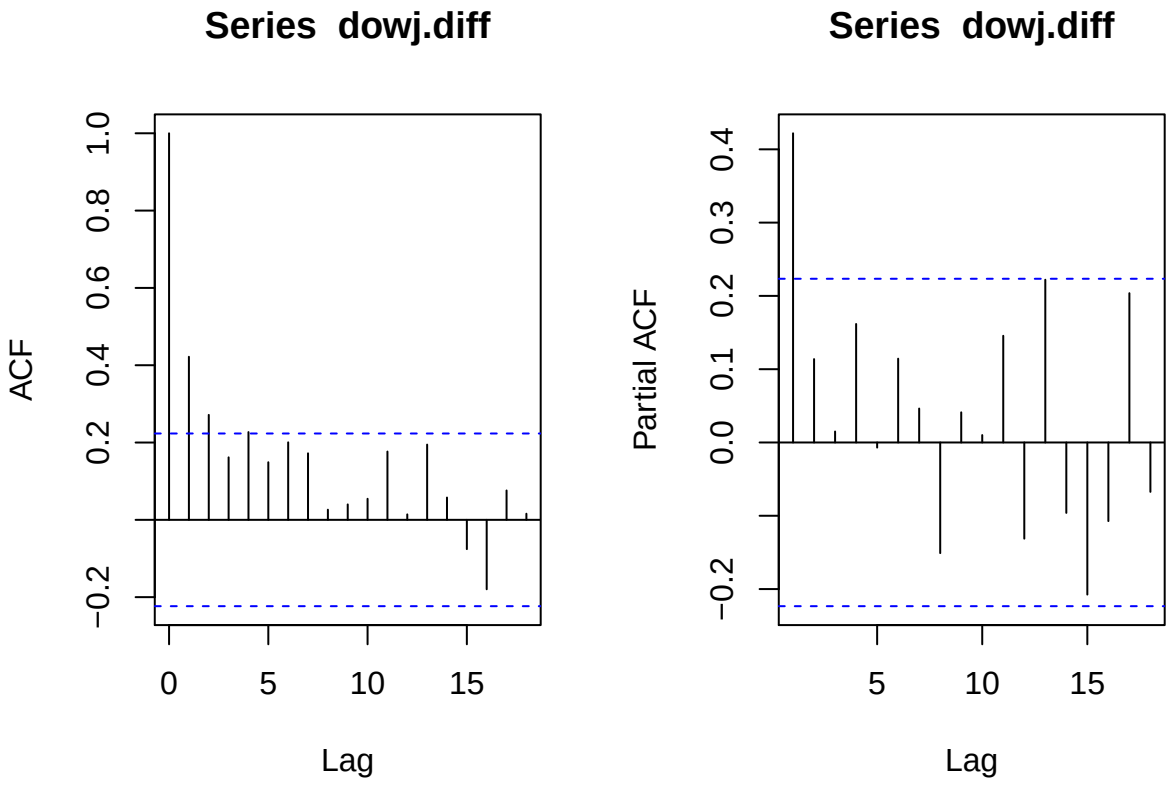
```
pacf(dowj)
```




```
par(op)
dowj.diff <- diff(dowj,1)
ts.plot(dowj.diff, main = "De-trended data")
```




```
op <- par(mfrow=c(1,2))
acf(dowj.diff)
pacf(dowj.diff)
```



```
par(op)
```