ETW3420

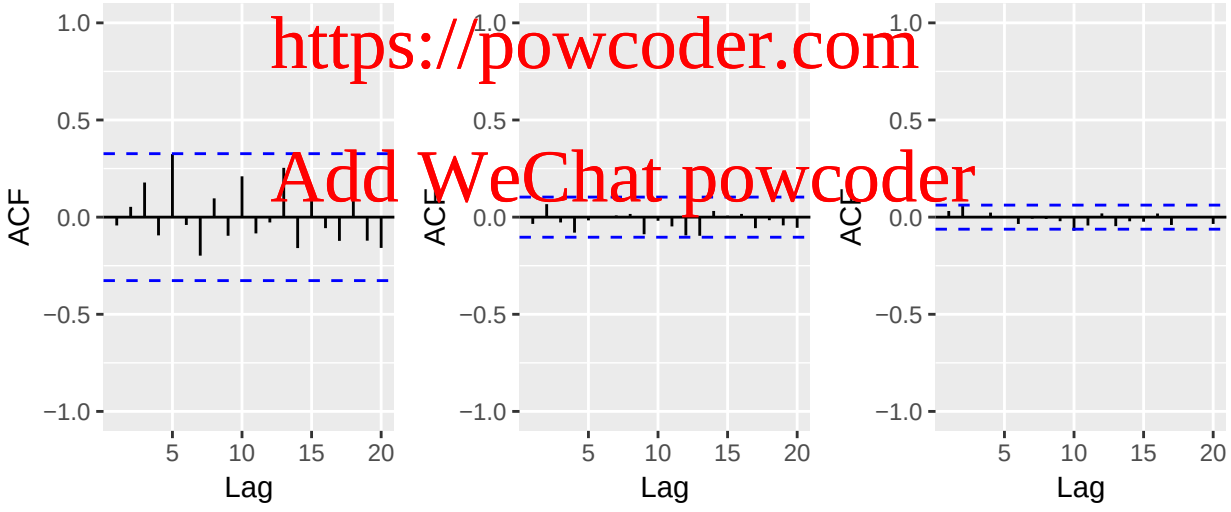
Principles of Forecasting and Applications

Topic 6 Exercises - Part 1

Question 1

The figure below shows (from left to right) the ACFs for 36 random numbers, 360 random numbers and 1,000 random numbers.

(a) Explain the differences among these figures. Do they indicate that the data are white noise?



(b) Why are the critical values at different distances from the mean of zero? Why are the autocorrelations different in each figure when they each refer to white noise?

Question 2

A classic example of a non-stationary series is the daily closing IBM stock price series (data set `ibmclose`). Use R to plot the daily closing prices for IBM stock and the ACF and PACF. Explain how each plot shows that the series is non-stationary and should be differenced.

```
ggtsdisplay(ibmclose)
```

Question 3

For the following series, find an appropriate Box-Cox transformation and order of differencing in order to obtain stationary data.

(a) `usnetelec`

(b) `enplanements`

(c) `visitors`


```
autoplot(usnetelec)
```

```
autoplot(enplanements)
```

```
autoplot(visitors)
```

Question 4

For the `enplanements` data, write down the differences you chose above using backshift operator notation.

Question 5 (Self-Practice)

The "retail.xls" file contains data on the retail sales in various categories for different Australian states. For this question, we will consider the retail turnover for New South Wales (A3349873A).

As per question 3, using this data set, find an appropriate Box-Cox transformation and order of differencing in order to obtain stationary data.

```
#Import data and convert into ts
myts <- readxl::read_excel("retail.xlsx", skip=1)[,"A3349873A"] %>%
  ts(frequency=12, start=c(1982,4))


#Plot data
ggtsdisplay(myts)
```