Applied Economic Forecasting

Homework Solution Sample Template

This template will provide a guide to what I anticipate that your homework solutions will look like. Please feel free to exercise your creativity when producing your solutions however.

- Unless stated, please display the R chunk that produced your results.
- Please ensure your do a quick spell check of your document. Press **F7** on your keyboard.
- **Whenever appropriate, please refer to the output.** Please take a look at the `.Rmd` to see how I am able to:

i. Add captions to my plots,
ii. hyperlink and reference the plots, and
iii. embed the results stored in the R chunks into my text.

Question 1: Generating random variables

i. Generate a random normal variable, `x1`, that has 50 observations, a mean of 75, and standard deviation of 5. That is $x1 \sim N(75, 5^2)$.

- Use a seed of 12345.
- set x1 as a ts object (`x1.ts`). Declare as a quarterly variable ending December 2020.
- Plot x1.ts

```r
set.seed(12345)
x1 <- rnorm(50, mean = 75, sd = 5)
x1.ts <- ts(x1, frequency = 4, end = c(2020, 4))
autoplot(x1.ts, col = "green4") + ggtitle("Plot of x1") + labs(x = "", y = " ")
```

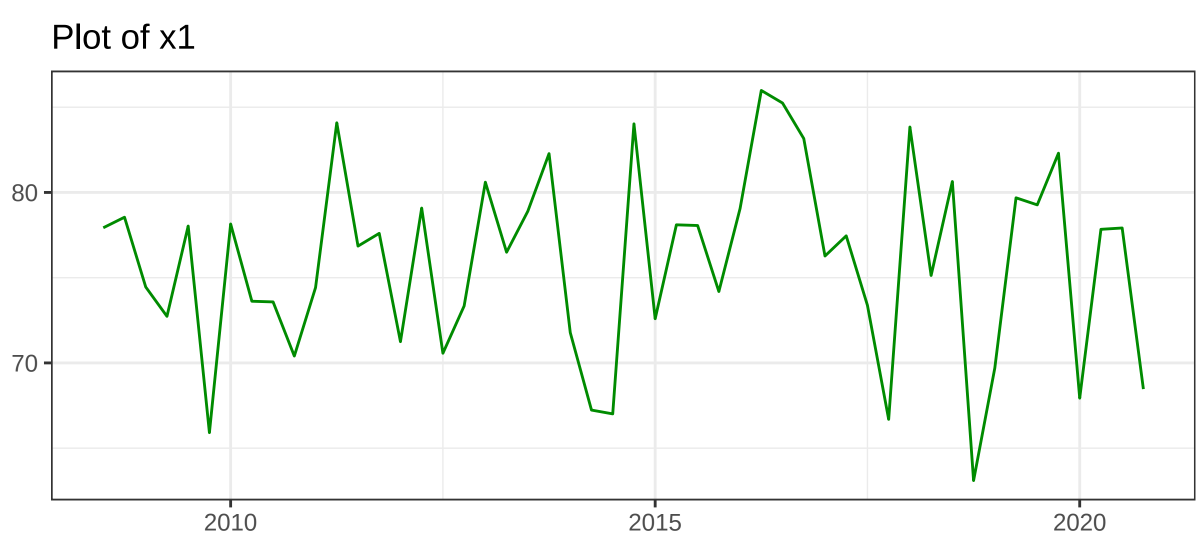

Figure 1: Plot of X1

ii. Do you notice any discernible patterns in the plot?

The observations of x1 in Figure 1 appear to be random with no discernible pattern.

iii. How do the sample mean and standard deviation compare to the population values?

```
meanx1 <- round(mean(x1),3)
stdx1 <- round(sd(x1),3)
```

The random draw of 50 observations has a mean of 75.898 and a standard deviation of 5.483. These are not too far off from their respective population values of 75 and 5, respectively.

Question 2: White Noise

i. Plot the ACF of this series and comment on your observations.

```
ggAcf(x1.ts, col = "blue4", lag.max = 24) + labs(title = "ACF Plot of x1")
```

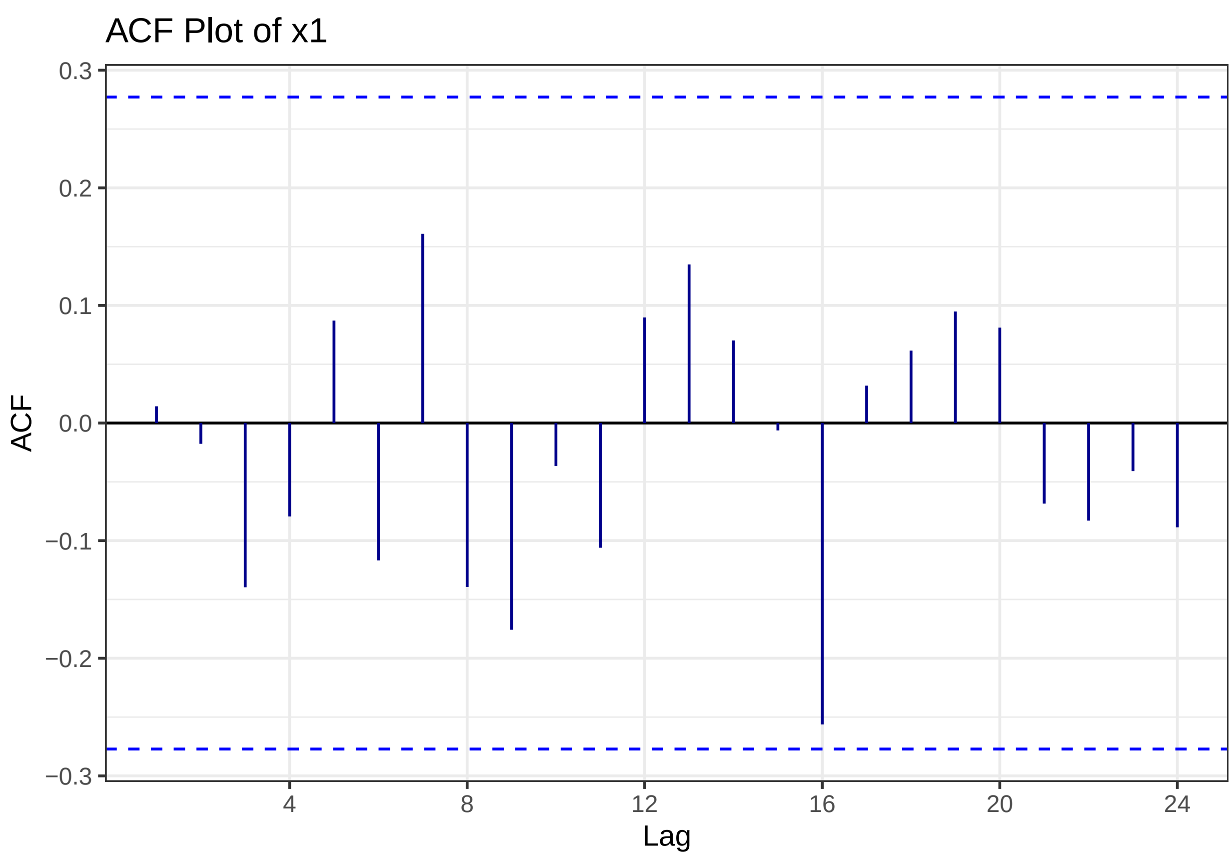

Figure 2: ACF Plot of X1

From the plots in Figure 2, all the autocorrelation statistics are within the 95% significance bands. Therefore, we can conclude that the series, `x1`, is not distinguishable from a white noise process.