Enders Time Series - Ch2 - Ex8

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2023-03-21

The file entitled SIM_2.xls contains the simulated data sets used in this chapter. The first series, denoted Y1, contains the 100 values of the simulated AR(1) process used in Section 7. Use this series to perform the following tasks (Note: Due to differences in data handling and rounding, your answers need only approximate those presented here.)

Upload packages

```
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.2.3
```

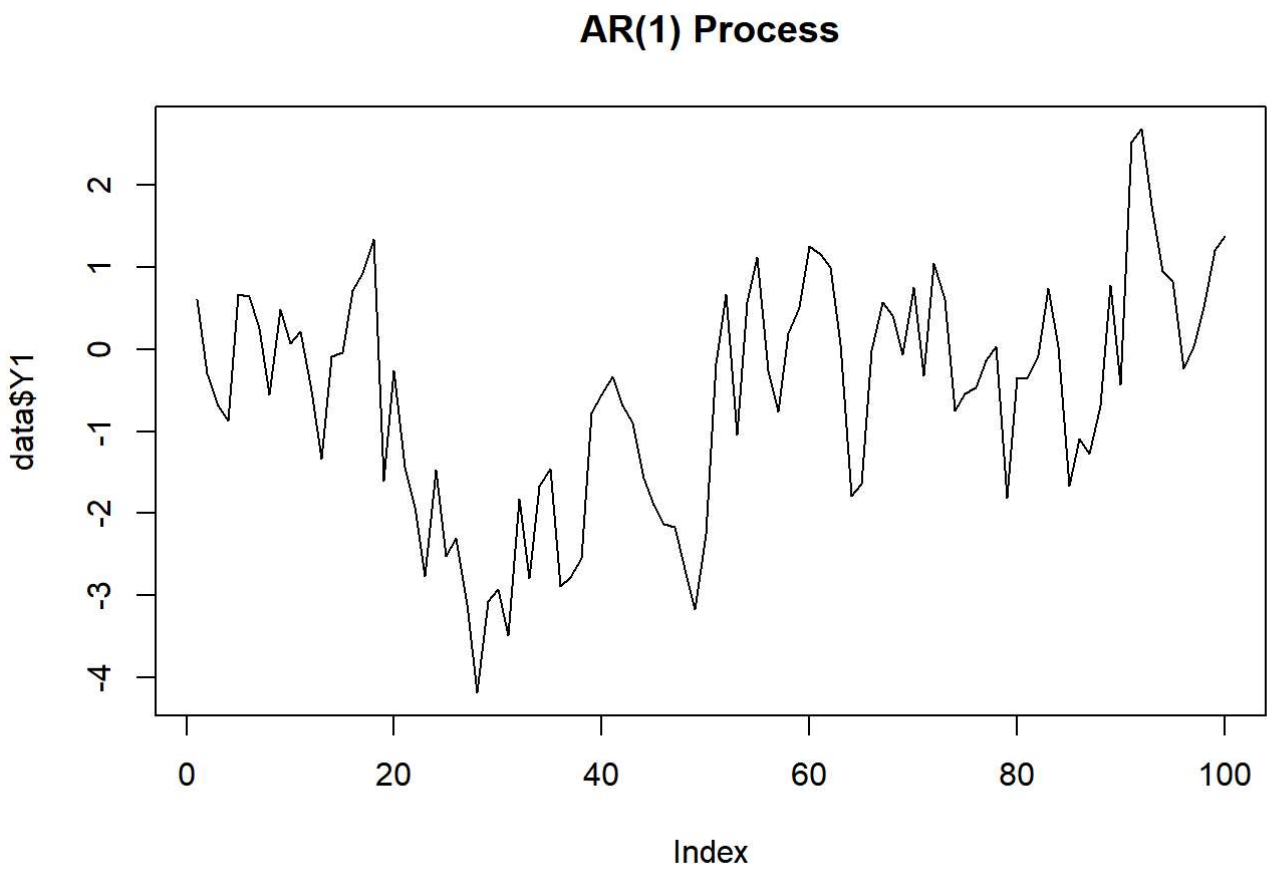
Upload data

```
data<-readxl::read_excel("sim1.xlsx")
```

a. Plot the sequence against time. Does the series appear to be stationary?

plot the time series

```
plot(data$Y1, type = "l", main = "AR(1) Process")
```



Estimate the series as an AR(2) process without an intercept. Letting et denote the residual (which may be serially correlated), you should obtain $y_t = 0.701y_{t-1} + 0.105y_{t-2} + \epsilon_t$

fit an AR(2) model without an intercept

```
model <- arima(data$Y1, order = c(2,0,0), include.mean = FALSE)
```

obtain the estimated coefficients of the AR(2) model

```
coef(model)
```

```
##       ar1       ar2
## 0.7016177 0.1039405
```

Estimate the series as an ARMA(1, 1) process without an intercept. You should obtain
$yt = 0.844y_{t-1} - 0.144\varepsilon_{t-1} + e_t$

Verify that the ACF and PACF of the residuals do not indicate any serial correlation.

fit an ARMA(1,1) model without an intercept

```
model1 <- arima(data$Y1, order = c(1,0,1), include.mean = FALSE)
```

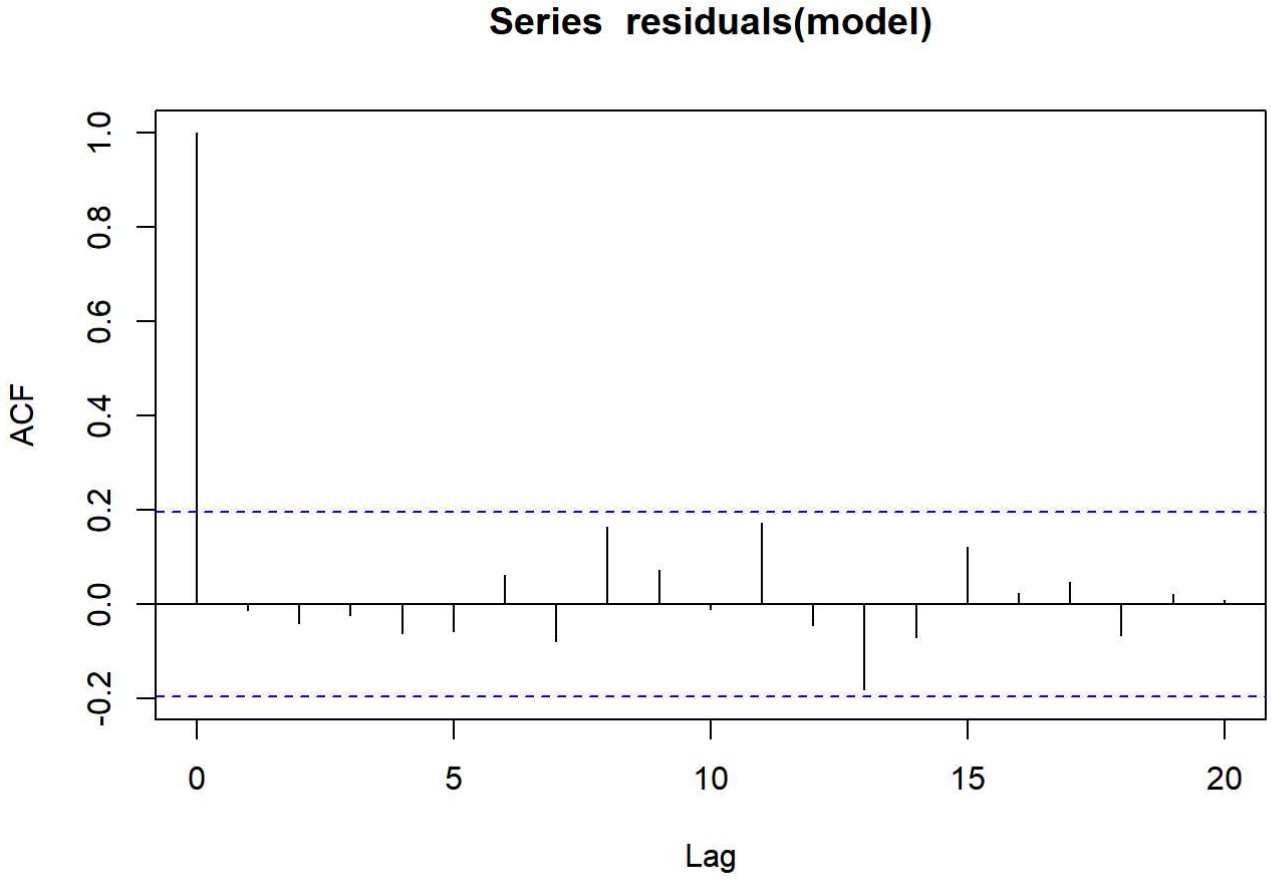
obtain the estimated coefficients of the ARMA(1,1) model

```
coef(model)
```

```
##       ar1       ar2
## 0.7016177 0.1039405
```

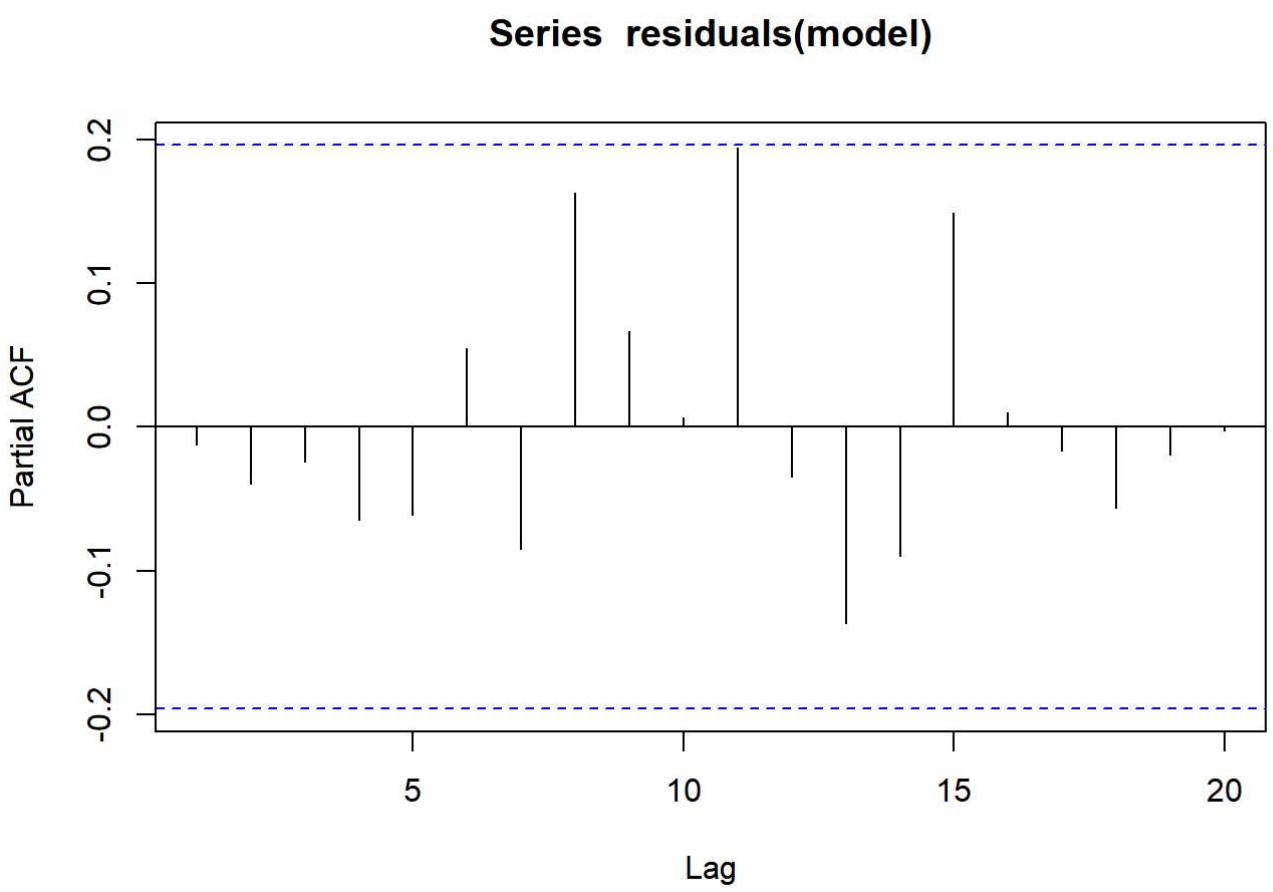
#ACF

```
acf(residuals(model))
```



#PACF

```
pacf(residuals(model))
```



Based on the plots generated by these functions, there do not appear to be any significant correlations in the residuals of the ARMA(1,1) model. This suggests that the model is adequate.