Series 9

1. We revisit Exercise 2 from Series 8. We are looking at the airplane data and want to compare three methods for forecasting: the forecasting for a SARIMA model, the exponential smoothing method and the forecasting for decomposed series. For beeing able to compare the three prediction methods with the real data, first read in the airplaine data and only use the observations from 1949 to 1957.

```
> d.air <- AirPassengers
> d.airshort <- window(d.air, end=c(1956,12))
```

a) Fit an ARIMA/SARIMA Model for the shorter dataset `d.airshort`. Use transformations if suitable. Compute a prediction for the years 1957 - 1960 and plot it along with the prediction band and the actual observations for this period.
   R-Hint: `predict(..., n.ahead=...)`

b) Now use exponential smoothing for predicting the years 1957-1960. Again plot the predicted time series, including prediction band and the actual observations. Check the residuals as well.
   R Hint: `?HoltWinters`

c) Now do prediction for the years 1957-1960 as seen in the lecture with linear extraploation of the trend estimate, continuation of the seasonal effect and and ARMA(p,q) forecast for the stationary remainder. Plot the predicted timeseries and compare them to the actual observations.

d) Which of the three methods seems best for the airplane data?

e) Do the same for the pine data. There use the dataset `d.foe2` to predict the years 1451-1500 and compare your prediction with the actual observations from `d.foe`.

```
> t.url <- "http://stat.ethz.ch/Teaching/Datasets/WBL/foehre.dat"
> d.foe <- ts(scan(t.url, skip=1), start=1107)
> d.foe <- window(d.foe, start=1201, end=1500)
> d.foe2 <- window(d.foe, end=1450)
```

Exercise hour: Monday, April 28.