Exercise Set 2

Instructions:

1. When you plot the required figures please include them in your report giving them a title that includes your name, surname and the timestamp. For example:
   plot(a10)
   title(main=paste("Name Surname, Timestamp:",Sys.time()),cex.main=0.8)
   using Sys.time() will give you the time and date.

2. Please include the code that created your figure or in general the code that you used to answer a question in your report.

Exercise 1:
Data set *books* contains the daily sales of paperback and hardcover books at the same store. The task is to forecast the next four days' sales for paperback books (data set books).

(a) Plot the series and discuss the main features of the data.
(b) Use simple exponential smoothing with the ses function (setting initial="simple") and explore different values of α for the paperback series. Record the within-sample SSE for the one-step forecasts. Plot SSE against α and find which value of α works best. What is the effect of α on the forecasts?
(c) Now let ses select the optimal value of α. Use this value to generate forecasts for the next four days. Compare your results with (b).

Exercise 2:
Use the monthly Australian short-term overseas visitors data, May 1985—April 2005. (Data set: *visitors*)
(a) Make a time plot of your data and describe the main features of the series.
(b) Forecast the next two years using Holt-Winters' multiplicative method.
(c) Why is multiplicative seasonality necessary here?
(d) Experiment with making the trend exponential and/or damped.
(e) Now fit each of the following models to the same data:
   (1) an ETS model
   (2) an additive ETS model applied to a Box-Cox transformed series
   (3) an STL decomposition applied to the Box-Cox transformed data followed by an ETS model applied to the seasonally adjusted (transformed) data.

Plot all the forecasts together.
(g) For each model, look at the residual diagnostics and compare the forecasts for the next two years. Which do you prefer?