

Exercise Set 1

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.
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Exercise 1:

For each of the following series, make a graph of the data with forecasts using the most appropriate of the four benchmark methods: mean, naive, seasonal naive or drift

(a) Price of chicken (1924-1993). Data set *chicken*.

(b) Monthly total of accidental deaths in United States (January 1973-December 1978). Data set *usdeaths*.

In each case, do you think the forecasts are reasonable? If not, how could they be improved?

Exercise 2:

Consider the daily IBM stock prices (data set *ibmclose*).

(a) Produce some plots of the data in order to become familiar with it.

(b) Split the data into a training set of 300 observations and a test set of 69 observations.

(c) Try various benchmark methods to forecast the training set and compare the results on the test set. Which method did best?

(d) For the best method, compute the residuals and plot them. What do the plots tell you?

Exercise 3:

The data below represent the monthly sales (in thousands) of product A for a plastics manufacturer for years 1 through 5 (data set plastics).

| | 1 | 2 | 3 | 4 | 5 |
|------------|----------|----------|----------|----------|----------|
| Jan | 742 | 741 | 896 | 951 | 1030 |
| Feb | 697 | 700 | 793 | 861 | 1032 |
| Mar | 776 | 774 | 885 | 938 | 1126 |
| Apr | 898 | 932 | 1055 | 1109 | 1285 |
| May | 1030 | 1099 | 1204 | 1274 | 1468 |
| Jun | 1107 | 1223 | 1326 | 1422 | 1637 |
| Jul | 1165 | 1290 | 1303 | 1486 | 1611 |
| Aug | 1216 | 1349 | 1436 | 1555 | 1608 |
| Sep | 1208 | 1341 | 1473 | 1604 | 1528 |
| Oct | 1131 | 1296 | 1453 | 1600 | 1420 |
| Nov | 971 | 1066 | 1170 | 1403 | 1119 |
| Dec | 783 | 901 | 1023 | 1209 | 1013 |

- (a) Plot the time series of sales of product A. Can you identify the seasonal fluctuations and/or a trend?
- (b) Use an STL decomposition to calculate the trend-cycle and seasonal indices. (Experiment with having fixed or changing seasonality).
- (c) Do the results support the graphical interpretation from part (a)?
- (d) Compute and plot the seasonally adjusted data.
- (e) Use a random walk to produce forecasts of the seasonally adjusted data.
- (f) Reseasonalize the results to give forecasts on the original scale.

[Hint: you can use the stlf function with method="naive".]