SMM634 Coursework 3 2020/21

Deadline 15 April 2021

NAME:

1. Let E_t be white noise with mean 0 and variance σ^2. Regard the following three processes:

   (a) $X_t = t + E_t$,

   (b) $Y_t = X_t - X_{t-1}$,

   (c) $Z_t = X_t - t$.

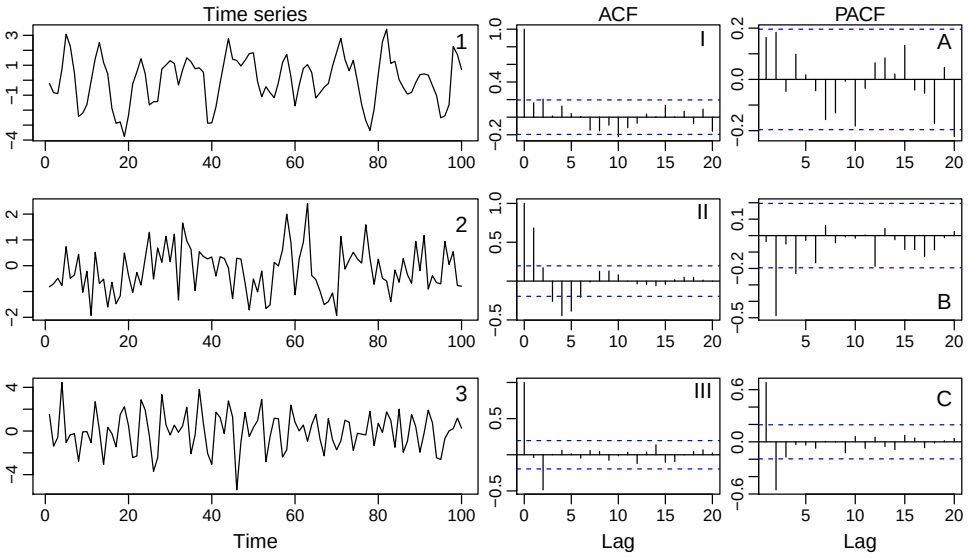
   Which of these three processes are stationary, and which are not? Why? [Marks: 10]

2. In this exercise we analyse pine data (`pine.dat`) which contain the measurements of the year rings of an 858 year old Douglas Fir from 1107 until 1964. We use only the data from 1201 until 1500.

   Fit an $ARIMA/SARIMA$ Model for this dataset. Use transformations if suitable. Compute a prediction and plot it along with the prediction band. Try different models and compare the outcome. Also analyse the residuals. [Marks: 10]

3. Figure below shows the plots of three time series and their correlograms for usual and partial autocorrelations. Unfortunately, we do not know which correlogram belongs to which time series.

   Can you help? [Marks: 10]



4. Read the paper ”Model-based clustering of Baltic sea-level” by Scotto, M.; Barbosa, S. and Alonso, A.M. (2009) available on Moodle. Write a report (not more than 3 pages) summarising the goals of the work, the data source, the methods used, the results of the analysis and the conclusions. Also, comment on the robustness and generality of the results, and limitations of the analysis. [Marks: 10]