Exercise 3

Simon A. Broda

1. (a) Open the file `simulations.xlsx`. The sheet "AR(1)" simulates $T = 1000$ observations from an AR(1) process. Play around with α and $-1 < \phi_1 < 1$ and describe your observations.

   (b) Also try setting $\phi_1 = 1$ and describe the effect of α.

   (c) The file `simulated_data.wf1` contains three series simulated using the same spreadsheet, `simulation.xlsx`, one each for an AR(1), an MA(1), and an ARMA(1, 1) process. The AR and ARMA processes use $\phi_1 = 0.7$, and the MA and ARMA processes use $\theta_1 = 0.7$. Describe your observations.

2. (a) Use the Box-Jenkins approach to model year-on-year real GDP growth in the file `realgdpch.wf1`.

   (b) Produce a forecast for 2022Q3 and 2022Q4, both manually and using EViews.

3. (a) Obtain the mean and variance of a random walk with drift.

   (b) Show that the random walk with drift is integrated of order 1.

   (c) Derive the expression for the variance of a stationary AR(1) given in the slides.

   (d) Find the mean, variance, and ACF of an MA(1).

   (e) **Optional**: Find the ACF of a stationary AR(1).