Homework 2

ECON312 Time Series Analysis

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Instructions

- The homework is due at due-time on **due-date**. No late submissions will be accepted.

- Students are encouraged to submit answers typed in TeX format. Such submissions will be rewarded with a bonus of 2% of the final grade.

- Homeworks must be submitted (uploaded to the course page) in pdf format named *Name_Surname.pdf*.

Assignment 1

Consider the following AR(1) model

$$y_t = c + \phi y_{t-1} + e_t$$

where the error terms are themselves AR(1) processes

$$e_t = \rho e_{t-1} + u_t \qquad\qquad u_t \sim IID(0, \sigma^2).$$

with $|\phi| < 1$ and $|\rho| < 1$.

1. Show that the process may be written as

$$y_t - c - \phi y_{t-1} = \rho \left(y_{t-1} - c - \phi y_{t-2} \right) + u_t$$

$$y_t = c \left(1 - \rho \right) + \left(\phi + \rho \right) y_{t-1} - \rho \phi y_{t-2} + u_t$$

$$y_t - y_{t-1} = c \left(1 - \rho \right) + \left(\phi + \rho - 1 \right) y_{t-1} - \rho \phi y_{t-2} + u_t$$

$$y_t - y_{t-1} = c\left(1 - \rho\right) + \left(\phi + \rho - \rho\phi - 1\right)y_{t-1} + \rho\phi\left(y_{t-1} - y_{t-2}\right) + u_t$$

$$\Delta y_t = c\left(1 - \rho\right) + \left(\phi + \rho - \rho\phi - 1\right)y_{t-1} + \rho\phi\Delta y_{t-1} + u_t$$

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \alpha_1\Delta y_{t-1} + u_t$$