

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

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

1. Show that the process may be written in the form of an augmented Dickey-Fuller test equation

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

and conclude that autocorrelation in the error terms can be eliminated by augmenting the model with a lagged first difference of the dependent variable.

2. What is the relationship between the parameters of the original model (c, ϕ, ρ) and the parameters of the new model $(\alpha_0, \gamma, \alpha_1)$?

3. Under what parameter values of (ϕ, ρ) does the process become a unit root process (i.e. $\gamma = 0$)?