

10/24. Assignment 4.

1. Consider the following AR model:

$$Y_t = 0.8 Y_{t-1} + \epsilon_t$$

Suppose that the variance of the white noise process terms is $\sigma_{\epsilon}^2 = 1$.

(a) What is the order p of this model? Give the values of each of its ϕ -parameters.

first order, so $p=1$. $\phi_1 = 0.8 = \frac{4}{5}$

(b) Using the results we have obtained in this week's videos, give the values of the mean function, autocovariance function and autocorrelation function for this model.

Mean function: $E(Y_t) = 0$ (assumption)

Auto covariance:

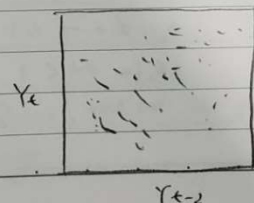
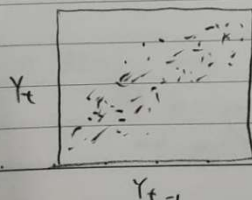
$$\text{if } k=0: \frac{\sigma_{\epsilon}^2}{1-\phi^2} = \frac{1}{1-\frac{16}{25}} = \frac{25}{9} \sigma_{\epsilon}^2$$

$$\text{if } k \geq 1: \phi^k \frac{\sigma_{\epsilon}^2}{1-\phi^2} = \left(\frac{4}{5}\right)^k \cdot \frac{25}{9} \sigma_{\epsilon}^2$$

Auto correlation: $\rho^k = \left(\frac{4}{5}\right)^k$ (1 for $k=0$)

(c) sketch what you think of the following plots might look like:

(i) Y_t vs Y_{t-1}



(d) Sketch the autocorrelation function for this model.

(i.e. ρ_k vs k)

