

MS course: TIME SERIES ANALYSIS WITH APPLICATIONS IN FINANCE

Final test, 9 December, 2020.

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You are assumed to send me the answers before 15:45 pm today in one handwritten pdf file to the email address below. Please, write on it: I certify that it is my own work and sign it. In case of any questions during the exam, you can contact me via Teams or e-mail: marianna.bolla@gmail.com

1. Define the autocovariance function and spectral distribution of weakly stationary multivariate stationary time series. Give the relation between the autocovariance function and spectral distribution function of weakly stationary multivariate processes. Give a sufficient condition for the existence of a spectral density matrix. Give the spectral representation of a multivariate, weakly stationary processes itself.
2. How can you estimate the parameters of weakly stationary time series, what does ergodicity mean in 1-dimension? How can you estimate the spectral density matrix in multi-dimension? What is the one- and multi-dimensional periodogram?
3. Define the one-dimensional AR(p) process, describe its stability and the Youle–Walker equations. Define the multivariate ARMA(p, q) process too with complex polynomials.
4. The Wold decomposition in 1-dimension and in multi-dimension. Classification of 1-dimensional and multi-dimensional weakly stationary processes; types of singular processes.
5. Prediction based on finitely and infinitely many past values in case of 1-dimensional and multi-dimensional, weakly stationary processes. Prediction errors and their behavior in case of regular processes. The essence of Kálmán's filtering.

You can get max. 10 points for each answer. I will contact you as for the result and the final grade I can offer. You can solve this test only if have the signature (at least 20 midterm points for the exercises or made presentation last week).