



Τμήμα Οικονομικής και Περιφερειακής Ανάπτυξης
Department of Economic and Regional Development

ASSIGNMENT

Applied Statistics

Submission Deadline: 12 January 2024, Time 23:59
Submission: bampinasg@gmail.com
Assignment Type: Personal

Prepare answers for the following questions and submit the R-script document and the word documents including your answers to the email given above.

- 1) Download a time series that contains a seasonal component.
 - a) Insert data into R-project
 - b) Transform the data into a time series object of the `ts` type.
 - c) Print the data and plot the time series.
 - d) Create a histogram to visually inspect the distribution of time series values. Add a kernel density estimate and a normal density function to the plot. (You may use the `gghistogram` function from the `forecast` package).

- 2) Check whether the time series is trend-stationary using the function `kpss.test` from the `tseries` package.
 - a) Plot the differenced time series.
 - b) Use the ACF and PACF functions from the `forecast` package to explore autocorrelation of the differenced series.

- 3) Find an appropriate (Seasonal) ARIMA model based on the ACF and PACF.
 - a) Provide the information Criteria values of the preferred model along with some variations on it (additional ARIMA models).
 - b) For the model with the smallest AICc value, check the residuals for autocorrelation, normality and heteroscedasticity.
 - c) Create a model using the `auto.arima` function from the `forecast` package.

- d) For both, the best model and the one provided by `auto.arima` function make forecasts for 8 periods ahead. Plot forecasts separately and provide the RMSE, MAPE and MAE forecast criteria for each model (use the `summary()` function). Which of the two performs best?
- e) Use the errors (residuals) from the two models based forecast to compare predictive accuracy of the two models with the Diebold-Mariano test (`dm.test()` function in the `forecast` package). Test the hypothesis that the best ARIMA based forecast is more accurate than the `auto.arima` model based forecast.