Math339 **Fall 2022**

HW02

Trun-in needs to be submitted through the coursesite link in PDF format, which could be done by

- *Scan the manual write-up into PDF file.*
- *Typeset your turn-in in editors and convert into PDF.*
- *Prepare your turn-in through software like OneNote, Notable, ... and then save/export as PDF.*

Referring to the data, **GNP.xlsx**, posted in HW02 folder on coursesite,

1. Generate the time-series plot for "gnp"series that is to be indexed by "date"series. Visually inspect the plot and comment on whether there is a linear trend.
2. Generate ACF and Variogram plots for "gnp"series and comment on whether it is stationary, why?
3. Assuming linear trend in the series, regress "gnp"on "t"with simple linear regression (SLR) model and report the following.
   (a) The fitted SLR model.
   (b) The significance of regression effect.
   (c) Model diagnostics.
4. Generate series and ACF plot for the raw residuals from the SLR fit. Comment on its plausible stationarity.
5. Referring to "TSA04.R"for the use of **gls** function (**nlme** package is required), perform the second order Cochrane-Orcutt procedure and report the fitted autoregression model (with the estimates of ϕ_1 and ϕ_2)
6. Generate ACF plot for the raw residuals from the SLR fit. Comment on the significance of its autocorrelation across the lags.