DSA 5203: Time Series Analysis – Spring2019
MID-TERM EXAM
Released on 28th,19 & Due on March 7th,2019

1. (20pts) Following the developments in Module 2.2, prove that the standard error in the estimation of the sample mean is $O(\frac{1}{\sqrt{n}})$ and that of the sample variance is $O(\frac{1}{\sqrt{n}})$.
2. (20pts) Download two time series from the website that exhibit seasonality and trend.
   http://www.statsci.org/datasets.html
   a. (5pts) Plot the original series, x_t
   b. (5pts) Plot y_t after removing the seasonality from x_t
   c. (5pts) Plot z_t after removing the trend in y_t
   d. (5pts) Compute the ACF for z_t

3. (20pts) Follow the developments in Modules in Part 4:
   a. (5pts) Derive an expression for the ACF for MA (2) model
   b. (5pts) Derive an expression for the ACF for AR (2). Apply this to:

$$y_t = .6y_{t-1} + .3y_{t-2} + \varepsilon_t$$

   c. (5pts) Plot the ACF
   d. (5pts) Derive an expression for the ACF of ARMA (1,2)