DSA 5203: Time Series Analysis – Spring2019
Homework -3

1) (10 points) Consider the US population growth data x_t from Module 1.2
   a) Define $y_t = \nabla x_t = x_t - Lx_t = x_t - x_{t-1}$ .compute and plot $(y_t \; Vs. t)$. Do you see a trend from this plot? Explain.
   b) Define $z_t = \nabla y_t = y_t - Ly_t = y_t - y_{t-1}$. compute and plot $(z_t \; Vs. t)$. Do you see a trend from this plot? Explain.
   c) Compute the mean, variance and auto - correlation ρ_k for z_t and plot $(\rho_k \; Vs. k)$
2) (10 points) Define $x_t = \text{acos}(t) + bsin(t) \; for \; 0 \leq t \leq 100$ where a and b are from $N(0,1)$ and are independent.
   a) Draw the pair a and b from $N(0,1)$ and plot $(x_t \; Vs. t)$ for $0 \leq t \leq 100$
   b) Repeat this experiment for 20 different pairs: a and b from $N(0,1)$ and plot all in the same plot.

NOTE: Read through the Modules 3.1 – 3.3