Assignment Two (Due 14/03/2024)

1. Show that if an AR(2) process is stationary, then

$$\rho_1^2 < (\rho_2 + 1)/2.$$

2. Find the ACF and PACF for $k = 0, 1, 2, 3$ and 4 for each of the following models:

(a) $Z_t = (1 - 0.8B)a_t$,

(b) $Z_t = (1 - 1.2B + 0.5B^2)a_t$,

3. Simulate a series of 1000 observations from each of the model with $\sigma_a = 1$ in **Q.2**. For each case, plot the simulated series, and calculate and study its sample $\hat{\rho}_k$ and PACF $\hat{\phi}_{kk}$ for $k = 01, 1, \cdots, 20$.

4. Verify whether or not each of the following models is stationary and /or invertible:

(a) $(1 - B)Z_t = (1 - 1.5B)a_t$,

(b) $(1 - 0.8B)Z_t = (1 - 0.5B)a_t$,

(c) $(1 - 1.1B + 0.8B^2)Z_t = (1 - 1.7B + 0.72B^2)a_t$,

(d) $(1 - 0.6B)Z_t = (1 - 1.2B + 0.2B^2)a_t$.