DATA130013: Homework 4

Due in class on April 17, 2019

1. Shumway's book (4th ed.) Problems 3.9, 3.14.
2. In Example 3.10 case (iii) of Shumway's book, when the AR(2) polynomial has two conjugate complex roots, prove the following result.
   (a) The constants c_1, c_2 in general solution form should satisfy $c_2 = \bar{c}_1$.
   (b) Write z_1 in polar coordinates, show that
   $$\rho(h) = a|z_1|^{-h}\cos(h\theta + b).$$
   where real constants a, b are to be determined by initial conditions.
   (c) Then repeat Example 3.11, display the ACF plot to see the exponential decay pattern with sinusoid pattern.
3. Refer to Example 3.17, derive the expression of ϕ_{hh}.
4. Use the notations in Definition 3.9 on page 99, show that both $X_{t+h} - \hat{X}_{t+h}$ and $X_t - \hat{X}_t$ are uncorrelated with $\{X_{t+1}, \ldots, X_{t+h-1}\}$.