STATS 3005 Time Series III
Assignment 5
2018

Assignment 5 is due by 5pm on Monday 22nd October 2018.

Assignments are to be submitted in the hand-in box on Level 6, Ingkarni Wardli

1. Consider the AR(1) process
$$Y_t = 0.8Y_{t-1} + Z_t$$
where Z_t is a white noise process with $\text{var}(Z_t) = \sigma^2$.
   (a) Find the spectrum, $f_y(\omega)$.
   (b) Obtain a plot of the spectrum $f_y(\omega)$ for $\sigma^2 = 1$.
   (c) Let $U_t = DY_t = (1 - B)Y_t$ be the process defined by differencing Y_t. Find the spectrum $f_u(\omega)$.
   (d) Obtain a plot of $|a(\omega)|^2$, where $a(\omega)$ is the transfer function of the differencing operator. Would you describe this a high pass filter, or a low pass filter?
   (e) Obtain a plot of the spectrum $f_u(\omega)$ for $\sigma^2 = 1$.

2. Consider the MA(2) process
$$Y_t = Z_t + 0.5Z_{t-1} + 0.5Z_{t-2}.$$
   (a) Find the spectrum by evaluating $f(\omega) = \sigma^2|\theta(e^{i\omega})|^2$.
   (b) Write down the autocovariance function directly.
   (c) Using the inversion formula, find γ_0.

[Assignment total: 20 marks]