ST3233: Tutorial 6

October 2016

1 Identification

Identify the following stationary processses as ARIMA(p,d,q):

1. $X_t = 0.5\,X_{t-1} + W_t$
2. $X_t - 0.5\,X_{t-1} = W_t - 1.3\,W_{t-1} + 0.4\,W_{t-2}$
3. $X_t - 1.5\,X_{t-1} + 0.6\,X_{t-2} = W_t$
4. $X_t - 1.2\,X_{t-1} + 0.2\,X_{t-2} = W_t - 0.5\,W_{t-1}$

2 Identification

Consider the stationary process

$$X_t = W_t + 0.5\,X_{t-1} + 0.5\,W_{t-1}$$

where W is a white noise process with variance 2.

1. Compute the variance σ^2 of this process.
2. Compute the first two autocorrelation coefficient $\rho(1)$ and $\rho(2)$
3. Simulate a trajectory of length $T = 10^5$ and empirically verify your answers to the previous two questions.

3 ARIMA modelling

Consider the time series `gnp` and `oil` contained in the file `tsa3.rda`. For both of these time series, try to make some forecast by first fitting an appropriate ARIMA(p,d,q) model to it.