

# Derivatives Lab

## Session 23

December 4, 2012

1. Generate and plot an artificial time series for the ARMA(1,1) process

$$Y_t - aY_{t-1} = \mu + \varepsilon_t + b\varepsilon_{t-1}$$

with  $\mu = 1$ ,  $a = 1/2$ ,  $b = 2/3$ , and  $\varepsilon_t$  is a i.i.d. sequence of Gaussian random variables with zero mean and standard deviation  $\sigma = 0.3$ .

2. Using the time-series generated above, estimate the parameters for the ARMA(1,1) above and compare with the model values. You can use the estimator

`http://thomas-cokelaer.info/software/spectrum/html/user/ref\_param.html#spectrum.arma.arma\_estimate`

If it is not already installed on your machine, you should be able to follow the installation instruction on the right hand menu of the documentation page.

3. Use the ARMA(1,1) estimator to estimate the volatility of your discrete geometric Brownian motion from the previous task sheet. Compare with the known model value and with your previous parameter estimates.