TS Module 18: Forecast updates and weights HW

(The attached PDF file has better formatting.)

Homework assignment: ARIMA(0,1,1) forecasts

An ARIMA(0,1,1) model for a time series of 100 observations, y_t, t = 1, 2, …, 100, has θ_1 = 0.4.

- The forecast of the next observation, y_{101}, is 25.
- The actual value of y_{101} is 26.
- The forecast of the next observation, y_{102}, is 26.
- The actual value of y_{102} is 26.

We continue to use the same ARIMA model. That is, we don't re-estimate the parameters with the additional data. We forecast y_{103}, the ARIMA value in the next period.

A. From the actual and forecasted values of y_{101}, derive the residual for the ARMA model of the first differences.
B. From the actual value of y_{101} and the forecasted value of y_{102}, derive the forecasted value for Period 102 for the ARMA model of the first differences.
C. This forecasted value for Period 102 is a function of μ, θ_1, and the residual for Period 101. Derive the μ (mean) of the ARMA model of first differences.
D. From the actual and forecasted values of y_{102}, derive the residual for the ARMA model of the first differences for Period 102.
E. Using this residual, determine the forecasted first difference for the next period.
F. From the forecasted first difference, derive the forecasted value of the original time series.

The values of μ and θ_1 are the coefficients of the ARMA process for the first differences. (Cryer and Chan use θ for an MA(1) process, not θ_1.)