

TS Module 15: Forecasting basics HW

(The attached PDF file has better formatting.)

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

An ARIMA(1,1,0) process has 40 observations  $y_t$ ,  $t = 1, 2, \dots, 40$ , with  $y_{40} = 60$  and  $y_{39} = 50$ .

This time series is *not* stationary, but its *first differences* are a stationary AR(1) process.

The parameter  $\theta_0$  of the stationary AR(1) time series of first differences is 5.

The 1 period ahead forecast  $\hat{y}_{40}(1)$  is 60.

We determine the 2 period ahead forecast  $\hat{y}_{40}(2)$ .

- A. What is the most recent value of the autoregressive model of first differences? Derive this value from the most recent two values of the ARIMA(1,1,0) process.
- B. What is the one period ahead forecast of the first differences? Derive this value from the the one period ahead forecast of the ARIMA(1,1,0) process.
- C. What is the parameter  $\phi_1$  of the AR(1) process of first differences? Derive this parameter from the 1 period ahead forecast.
- D. What is the two periods ahead forecast of the AR(1) process of first differences? Use the parameter of the AR(1) process.
- E. What is the two periods ahead forecast of the ARIMA(1,1,0) process? Derive this from the two periods ahead forecast of the AR(1) process.