Task: forecast the real price of gasoline for the US.

Dataset: gasoline.xlsx contains two monthly time series. The nominal price of gasoline and the CPI.

1. Create the real price of gasoline
2. Plot real and nominal prices over time
3. From now on you will work with logs: y_t = log (Real Price$_t$). Consider the sample from obs 1 to Dec 2014. Plot the sample ACF of y_t and that of $\Delta y_t = (y_t - y_{t-1})$.
4. Using the same sample above fit two AR(1) models: the first for y_t and the second for Δy_t. Report in both cases the coefficient associated with the lagged dependent variable.
5. Produce a series of 1 step-ahead forecasts for y_t. Use the following models: random walk (no drift), ARIMA(1,1,0), ARIMA(0,1,1), ARIMA(1,1,1). To produce forecasts start from the sample that ends in Dec 2014 and add 1 observation at the time (i.e. expanding/recursive scheme)
6. Transform the forecasts to levels (i.e. real prices)
7. Compute the mean squared forecast error and comment.