

Problem Set 6

1. Simple computer exercise involving unit roots. We will conduct simple one sided hypotheses on the following AR(1) model:

$$y_t = \rho y_{t-1} + \epsilon_t$$

ϵ_t is assumed independent white noise, $t = 1, 2, \dots, T$.

To generate a time series of observations, draw y_0 from a standard normal distribution, and draw ϵ_t i.i.d. standard normal, and set $\rho = 0.75$.

Set $T = 100$ and estimate ρ by OLS as on page 573 of Hayashi. Using a standard t test, test the null that $\rho = 1$ versus the alternative that $\rho < 1$. Do this for 1000 replications so you can report RMSE, and the fraction of replications for which you reject the null hypothesis. Repeat this exercise for $T = 200$ and $T = 400$.

Finally, do the same as above but now generate data for $\rho = 1$.