STATS 3005 Time Series III
Assignment 1
2018

Assignment 1 is due by 5pm on Friday 3rd August 2018.

Assignments are to be submitted in the handin box on Level 6, Ingkarni Wardli

Suppose $Z_0, Z_1, Z_2, Z_3, \ldots$ are independent random variables with $Z_t \sim N(0,1)$. Let $Y_0 = Z_0$ and

$$Y_t = \sqrt{1 - \frac{1}{t^2}} \times Y_{t-1} + \frac{1}{t} \times Z_t$$

for $t = 1, 2, 3, \ldots$.

1. Show that $\{Y_t\}$ is marginally stationary.
2. Calculate $\text{cov}(Y_t, Y_{t-1})$.
3. Hence determine whether Y_t is second order stationary.
4. Simulate a realisation of the sequence $Y_0, Y_1, \ldots, Y_{999}$ and plot it in `R`.
5. Compare the behaviour of the series in Question 4 to a white noise series.
6. Explain how marginal stationarity occurs in the process defined here.
   [**Hint:** Repeat the simulation in Question 4 a few times.]

Assignment total: 20 marks