STAT 496 name _____
October, 2016

Exam 1, Part II

Due by 5:30PM, Wednesday October 12

This assignment is a take-home Part II of Exam 1. You **may not** collaborate with *any* other person (whether in the class or not). Professor Bailey *will* answer questions. You **may** use any reading material (class notes, books, etc.) you wish.

Show all work. 1 Problem. 25 points total.

(25pts) 5. Consider the AR(2) model:

$$Y_t = 1.4Y_{t-1} - 0.48Y_{t-2} + e_t$$

where $\{e_t\}$ is a mean zero white noise process with constant variance σ_e^2.

(a) Write down the stationarity conditions for an AR(2) process. Is this model stationary? Expain.

(b) Calculate ρ_k for $k = 0, 1, 2, 3, 4, 5$.

(c) Sketch or plot the ACF ρ_k for $k = 0, 1, 2, 3, 4, 5$.

(d) In R, simulate a series of 500 observations from the model with $\sigma_e^2 = 1$. Use the R `set.seed(5)` function, so that you can reproduce your results. For the simulated series:

(i) Plot the series.

(ii) Plot the sample ACF r_k.

(iii) Compare the sample ACF for $k = 0, 1, 2, 3, 4, 5$ to the theoretical values from (b). To compare the values, make a table that has both the theoretical ACF (ρ_k) values and the sample ACF (r_k) values for lag $k = 0, 1, 2, 3, 4, 5$.