STAT 496 November 2016 name_

Exam 2, Part II

Due by 5:30PM, Wednesday November 21

This assignment is a take-home Part II of Exam 2. 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. 2 Problem. 20 points total.

1. Data: Annual U.S. tobacco production, 1871-1984, in millions of pounds.

The data are in a file and you can source the file that will create a time series object named UStobacco. Do not assign this to another object, just use the source command:

```
> source("http://www-rohan.sdsu.edu/~babailey/stat496/ustobacco.dat")
```

(You should now have the dataset and can check by typing UStobacco at the R command line and hit return.)

(a) Plot the series. Is the series stationary? Explain.

(b) Plot the log-transformed series. Is the series stationary? Explain.

(c) Plot the difference of the log-transformed series. Is the differenced log-transformed series stationary? Explain.

(d) From the sample ACF and PACF of the differenced log-transformed series, what is an appropriate model?

(e) Fit the model suggested by (d). Use the R function arima.

(f) Make and include the diagnostic plots from the R function tsdiag and a normal Q-Q plot of the residuals. Looking at all the diagnostic plots, how well does your model fit the data?

2. Consider the ARMA(2,1) process,

 $(1 - 1.2B + .8B^2)Y_t = (1 - .8B)e_t$

where e_t is a mean zero white noise process with constant variance σ_a^2 .

Express the process in an MA representation. Give the first three ψ_j weights, j = 1, 2, 3. (Note: $\psi_0 = 1$)