

Exam III

DUE: Friday, April 10, 2020 @ 11:59PM

Name: _____

Your Dataset Number: y01

Directions: Download the following data and answer the following questions. Submit your answers as an R Markdown file using the proper procedure.

The Data

Run the following line to enter the data into R:

```
> load(url("http://goo.gl/Zqn3Ea"))
```

After running the above line, your data will be available as a time series object called `y##` where `##` is your student number. **Also note that for Spring 2020 everybody's student number is 01.** You can type

```
> plot(y01)
```

at the command prompt for a quick look at the time series assigned to student 01. These data are the time series which you will use to answer the following questions.

Problem A

This problem deals with the seasonal means model. The data are seasonal, **quarterly data**.

1. Use the computer to fit a seasonal means model to the data. Report the summary output and write your estimated model in difference equation form.
2. Assess your model's fit using one or more of the following diagnostic measures: time series plot, normal QQ plot, ACF, Ljung-Box, Runs test, and so forth.
3. Using your model, forecast for two years in the future. Recall that if your model is called `mymodel` then one way to accomplish this is with the `xreg` argument of the `forecast()` function. You should include a graph of the forecasts (like we did in class) and report the numerical value of your latest forecast.

Problem B

This problem deals with multiplicative seasonal ARIMA models. Recall: the data are seasonal, **quarterly data**.

1. Fit the model $\text{ARIMA}(1, 1, 1) \times (1, 1, 0)_4$ to your (untransformed) data. Note that these data are **quarterly**, so mind the **period** argument to the **Arima** function. Report the summary information like you did for the previous problem.
2. Assess the model's fit using one or more of the following diagnostic measures: time series plot, normal QQ plot, ACF, Ljung-Box, Runs test, and so forth.
3. Suggest an alternative model to try, based on your answer to the previous problem. It is not necessary to report the fitted alternative model.
4. Using your model from part 1, forecast for two years in the future. Recall that if your model is called `mymodel` then this is accomplished with `forecast(mymodel, h = k)` for suitably chosen `k`. You should include a graph of the forecasts (like we did in class) and report the numerical value of your latest forecast.

Problem C

You have now fit two plausible models to the same data using radically different approaches. Compare and contrast the results. Which of the two models do you think is better for these data? Explain.

Assignment Deliverables:

Submit your R Markdown (.Rmd) file through Blackboard by the due date, Friday, April 10, 2020 @ 11:59PM. (Early submission is encouraged.)