EC 361–001

Midterm Exam

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`INSTRUCTIONS`: For this **Midterm exam**, you will work with a **time series of your choice**, applying the concepts and techniques we have studied until lecture **010** (*Forecast accuracy measures*).

When choosing the time series to work with, you have only two prerequisites:

1. The time series must be in *weekly* (regular), *monthly*, or *quarterly* frequency (that is, don't use *annual* data for now);
2. You should use *not seasonally adjusted* data.

The **source** of your data should be acknowledged in your plots. As far as *where* to look for data, it all depends on your own interests. However, `FRED` is an excellent place to start from, as it makes it quite easy to access data in different formats, frequencies, and with/without seasonal adjustment.

After your time series is chosen and you have done all the pre-work to get started, you may address the proposed tasks on the next page.

Recall that you may work either *individually* or in *pairs*.

`Exam due Mar 29 (Fr), 12:20 PM`.
`Points Possible: 50`

- You have 1 week to complete this exam. In accordance with our `course syllabus`, no late submissions will be accepted.
- Be honest. Don't cheat.
- As a Skidmore student, always recall your votes of academic integrity, and the **`Honor Code`** you have abided by:

> *"I hereby accept membership in the Skidmore College community and, with full realization of the responsibilities inherent in membership, do agree to adhere to honesty and integrity in all relationships, to be considerate of the rights of others, and to abide by the college regulations."*

Have fun!

`PART 1: VISUALIZATION`. We have learned several visualization techniques in lectures `003` and `004`. Now it is time to apply the appropriate graphics according to your chosen data. Thus, carefully think about which plots are relevant to show the relevant **features** of your data (e.g., trend, cycle, seasonality), and then interpret them accordingly. Do not forget to label the axes, mention source(s), and give informative titles and subtitles.

`PART 2: DECOMPOSITION`. After informing your reader about the data you are working with, it is time to apply the appropriate **adjustments** to your data. In lectures `005` and `006`, we studied data transformations and the main decomposition methods. Here, you will conduct the necessary data transformations (if any), and, in case you choose to work with seasonally adjusted data, you will choose the most convenient seasonal adjustment method to your time series. Make sure to *clearly explain* all your steps, so your reader can follow your thought process.

`PART 3: IN-SAMPLE FORECASTING`. After adjusting your data, you will run *in-sample* forecasts. In other words, define a *training set* from your whole sample period, and run the **benchmark** forecasting methods we have learned in lecture `007` to these training data. Make sure to display these forecasts in a *clear* graphical manner. Recall that you need not run *all* benchmark methods we have learned. You should apply the most appropriate ones according to the data you are working with, making sure to clearly explain your choices. Lecture `009` may be useful here in case you have applied transformations and decomposition methods to your data.

`PART 4: ACCURACY`. After running these benchmark methods to your training data, it is time to compare the performance of your different forecasts using the **accuracy measures** learned in lecture `010`. *Which* method has the best *in-sample performance* for your data? Clearly explain.

`PART 5: OUT-OF-SAMPLE FORECASTING`. Finally, you will choose the *best* forecasting method from the last part and perform out-of-sample forecasts. Carefully choose a forecast horizon and display the forecast in a clear and informative way. Then, explain using your own words what you are predicting for your data. Make sure to address the proper **residual analyses** shown in lecture `008`, especially related to autocorrelation issues.

> You will **submit** your Midterm exams via `theSpring` in a single `PDF` file containing your *plots* and *written* answers. No need to include any R code here. In the introductory R video lectures, you were taught how to export R plots and use them in external documents.