

# Midterm and Final Project/Exam

## Econ 8310 - Business Forecasting

### The Goal

---

This project is designed to give you a chance to create a solution to a complex real-world problem using the tools from this course as well as previous courses. My intent is to allow you and your team (this is REQUIRED to be a group project) to demonstrate your ability to identify the problem, find the necessary data, choose an appropriate solution from your forecasting toolkit, and present your solution to the rest of the class. The problem will be provided by the instructor, but it will be your job to interpret that problem and create insights.

### The Problem

---

For this project, we will be using Amazon customer data to model and forecast purchase behavior within a category or demographic. You will have five years of past consumer behavior, and I ask that you forecast the next three months at either the daily or weekly level.

- If you choose to model a category of goods, you must break down demographics within that category
- If you choose to model a demographic, you must break down categories consumed by that demographic

Your forecast should not only describe what your group expects to happen over the next three months. You must also describe actions driven by the data that could be taken to increase sales within your chosen category/demographic.

### Data Source

---

The data can be found here:

- Open e-commerce 1.0: Five years of crowdsourced U.S. Amazon purchase histories with user demographics

## Team Work

---

I expect all team members (a team should not be fewer than two or more than three people) to participate equally in the project. If it becomes clear to me that this does not happen, I reserve the right to assign different grades to different team members, or to penalize teams for not collaborating.

The real world expects us to work in teams, so we will do that in class as well.

## Project Proposal

---

1. An executive summary of the problem you plan to answer and your *anticipated* solution (max 1 page single spaced not counting visual aids)
  - (a) Should be clear and concise
  - (b) Needs to be readable by non-specialists
  - (c) Should not contain code, but may contain one or two visuals
  - (d) Will serve as a road map for your final project

## Semester Project Submission

---

1. An executive summary of the problem and your solution
  - (a) Should be clear and concise
  - (b) Needs to be readable by non-specialists
  - (c) Should not contain code, but may contain one or two visuals
  - (d) Single spaced, 3 to 5 pages not counting visuals
2. Prepare a 7-10 minute group presentation of your solution that will be delivered during finals week
  - (a) ALL team members should be part of the presentation
  - (b) State findings first, then detail the why and the how
  - (c) May use whatever presentation technology you want
3. Your code, as well as any data file(s) beyond those listed above that you used (we share both in order to enable replication, since this is a critical component of analysis)

- (a) Please comment all code, to make it clear to new readers
- (b) I should be able to run the code without errors from start to finish on my computer with no modifications aside from updating directories

## Tools

---

A list of tools and useful documentation.

- Least Squares Regressions
- ARIMA Models
- Generalized Additive Models - Prophet OR PyGAM
- Exponential Smoothing Models
- Decision Trees
- Random Forests
- Boosted Trees (with xgboost)
- Neural Networks (using PyTorch)
- Bayesian Modeling (using the pymc library, be sure to use the resources labeled “current”)

## The Rubric (Proposal)

Category	Full Points	Half Credit	No Credit	Points Possible
Proposal	The proposal is clear and concise, discussing major goals and tools of the project	Does not discuss all essential points, or is not be clear in describing goals or process	No proposal provided	2 points
Diagnosis of Data	Group provides clear justification for proposed analysis and model	Justification for proposed analysis and model is somewhat unclear	No clear justification for proposed analysis and model	1 point
Plan of Action	Identifies method of analysis to pursue, method is justified by the problem and data	Flawed method of analysis proposed, or method is only partially justified by the problem and data	Provides no plan for analysis	2 points
Overall				5 points

## The Rubric (Project Submission)

Category	Full Points	Half Credit	No Credit	Points Possible
Executive Summary	The summary is clear and concise, discussing major points of the project	Does not discuss all essential points, or would not be clear to non-specialist	No summary provided	5 points
Presentation	Presentation is clear and thorough	Presentation is clear	Presentation unclear or poorly planned	5 points
Diagnosis of Data	Provides clear justification for analysis and model	Justification for analysis and model is somewhat unclear	No clear justification for analysis and model	5 points
Analysis	Method of analysis is appropriate for the stated goals and is successfully conducted	Flawed method of analysis proposed, or method is not correctly applied	Analysis is inappropriate or incomplete	10 points
Overall				25 points