Unfortunately, the journey towards the final product of this 1-credit independent study was not as smooth as I would have hoped for. However, I believe that, overall, I met the objective of this independent study. The original objective of taking on this study in the first place was to design a project to fulfil the missing 1-credit I did not have from CSC-148, due to me taking an equivalent for 3 credits (instead of the required 4 for this class) while abroad in Rome. To complete this objective, Professor Godwin and I decided that it would be best if I analyzed a data set with the main goal “to find an answer to not only the initial research question but also be able to change the dataset and parameters and still be able to use the program.” To achieve this goal, we wanted to combine my data analysis and coding skills by using python to analyze a dataset. There were multiple steps I knew I would need to take to achieve this. These steps included, defining a question to answer, finding a good fitting dataset, researching how to best execute the project, learning new Python libraries, and learning to visualize and manipulate data.

The first delay we encountered came quite early on as the independent study did not get approved until September 30th. Once approved, it came time to decide on a topic and guiding question. At first, I thought it would be best to focus my study on subject matter that Professor Godwin was already familiar with, such as files found on Open Data DC. Next, I encountered numerous issues trying to find a plausible dataset and once I did, there was difficulty trying to download it. This is when I got the idea to shift the focus of the independent study towards creating a Discounted Cash Flow (DCF) statement using Python. A (DCF) is an imperative tool that investors use to determine the enterprise value of a company. In short, it involves projecting future free cash flows and discounting them to the present value based off the historic periods on the Income Statement, Balance Sheet, and Statement of Cash flows. Changing the focus of this project ended up being an excellent decision as I am much more passionate about this new topic than I was about the original one. One of the great parts about the change was that it did not require an alteration to the “main goal”. I still set out and achieved the goal of manipulating a dataset and certain input parameters to ultimately solve a question. The question to solve eventually became “what is the value per share of a publicly listed company?”

Shortly after changing the focus of the project, I conducted research to learn what an API is, and which one would be the best for me to use for my project. I decided to go with Financial Modeling Prep because of their easy-to-use website, well documented API instructions, and the breadth of data that they provided beyond what I needed for this project. I started off writing the code completely from my own financial knowledge, however I realized that I needed some guidance, especially when learning a new package. I found a YouTube video to aid with some aspects and from there learned that the Pandas library would be the best one for this sort of project. Over the duration of this project, I learned many things about Pandas, mostly pertaining to data frame manipulation and alteration. I also briefly used the Matplotlib and NumPy libraries. Throughout the programing process I tried to implement the concepts of object-oriented programing wherever possible. However, as deadlines were approaching, I decided to shift gears and focus more on a procedural approach.

Ultimately, I presented the project disappointed with what I had. I wasn’t disappointed because I thought I did poorly, I knew I did well and did everything required to get a good grade, I was disappointed because the program was not working as I dreamed. When I set out to start this project, I set high expectations for myself because of how passionate I was about the project topic but did not get as far as I had hoped. However, I believe I met all expectations required to achieve an ‘A’. As stated previously, the ultimate objective of this project was to make up for the one credit I was missing from CSC-148. I believe the level of complexity of the code used in this project is in-between 148 and 208. Furthermore, the length of the project is longer than anything I did in 148. Although different from the initial project proposal the goals were all achieved. I am able to change the parameters of the “ticker”, “periods to project” and “historic periods to analyze” to produce different results. I was able to analyze a dataset by manipulating the data to achieve different crucial financial information, such as the free cash flows. Lastly, I wrote the code in a concise and clean manner. I know it is not shown in the Git, but I spent a good portion of this project writing code, testing if it worked, and then rewriting it into a more efficient manner.

Looking back at this project, there are a couple of things that I would have done differently. For starters, I would have used Jupyter instead of PyCharm as the IDE. This IDE was recommended to me by both Professor Godwin and the data scientist professional I spoke with regarding this project. This would have allowed me to block test my code amongst other things. Secondly, I wish I would have used the Yahoo Finance API instead of Financial Modeling Prep. This is because Yahoo Finance is used more by professionals and does not require a subscription (as I found out the hard way). The reason I didn’t was because I couldn’t find a lot of documentation about how to use the Yahoo Finance API. However, now that I have a better understanding about how APIs work, I believe I could figure it out. Thirdly, it would have been better if I had written the Balance Sheet, Cash Flow, and Income Statement into a generic “Financial Statement” Class. This would have saved memory and lowered runtime. These are the major things I would have done differently.

Just because I have submitted the project and the semester is over does not mean I will stop working on it. Like I said, I am passionate about this project and learning to code and want to continue to develop my program. Along with the changes listed above there are a few other things I want to do. Firstly, use the free cash flows I forecasted to generate the equity value of a company. Next, I would like to calculate the Weighted Average Cost of Capital value myself instead of pulling it from the API. I would also like to create a simple GUI that can take in different inputs to change the equity value. I would like to generate graphical visualizations depicting how different inputs would change the final value per share. In the longer term I would also like to combine the DCF with different risk and optimal portfolio calculations.

Lastly, I would like to thank Professor Godwin for his assistance, guidance, and patience throughout this process. I greatly appreciate you agreeing to take on this 1-credit independent study and your assistance throughout. I look forward to remaining in touch during my last semester in the spring and beyond. Happy Holidays!