

In this homework, we will go through a few advanced data structures in MATLAB, such as cell arrays, classes, strings, as well as matrix importing in MATLAB.

1. In this problem you will be dealing with stock data from 2010-2011. The file *StocksAll.csv* contains closing price data from the S&P 500 and 5 other stocks (Amazon, BlackRock, MasterCard, Oracle and T-Mobile). There is one header column with the dates and one header row with the stock names. If you can, it may be best to inspect the data beforehand. You will be computing daily stock returns in this problem. The formula to compute the return on day  $i$  is:

$$r_i = \frac{V_i - V_{i-1}}{V_{i-1}}$$

where  $V_i$  is the closing stock price on day  $i$ . **Important Note:** If the closing stock prices data starts at day  $i$  then your first return datapoint will only be on day  $i + 1$ .

- Begin by creating a class called *Date* with private properties: year, month and day (all doubles). The class itself will also have a constant property (check out what that means) called months which will contain a string array with all of the month names (could be abbreviations). Its constructor will take a string with the date in month/date/year notation and fill the corresponding properties by splitting up the string. It will also have a method which will report the date as a string as in this example: Jan. 1, 2010 (the month should come from the months constant property).
- Next, create a class called *Stock* with private properties: symbol (string), Dates (cell array of Date objects), and returns (double). The constructor will take a symbol name, a cell array of Date objects and an array of stock closing pricing data. It will then calculate the returns and store them in the returns property. It will also have a method which will plot these returns. Make sure this function creates plots which have a title and a few tick labels (maybe one at the start, end and somewhere in the middle; use your Date class's reporting method to obtain these tick labels).
- Now, in your main script, import the data from the file using the function *importdata* (**Important:** please use a relative path and assume the data is in the same directory as the program file). This will return a struct with 2 fields: the data matrix and a matrix with just the row and column headers. Extract the dates into a string array and do the same with the stock names.

- Next, create Date objects for all the dates and then Stock objects for all the stocks (and S&P 500). **Note:** Create the Stock objects without the first Date object since while the closing price data starts on the first date, the returns data starts on the second date.
- Finally, create plots for all of the stock returns (and S&P 500) using the Stock method you created to do so.