Recitation 1

Friday 2nd September 2022

Question 1

Computing paper fold

1. Work with an actual piece of paper to get the relationship between the folds and the thickness.

2. Use this relationship to compute the number of folds required to exceed the given height.

Question 2

Decreasing volume of water

Steps

1. Set initial volume of water to an arbitrary value, say V1.

2. Initialize time counter (t)

3. Using the formula given, iteratively look for time t at which the volume of the tank is less than V1/2

Question 3

Computing Compound interest over 5 years

$$A = P(1 + \frac{r}{n})^{nt}$$

NB: Compound interest is to be computed for the 5 years separately (5 values required)

Question 4

Computing monthly payments to pay off debt.

Hint: Use loan payment formula.

Note that number of period should be in months.

Question 5

Computing number of days it will take to repay initial investment

Steps

1. Set initial number of customers

2. Initialize payments and days (variables) to 0

Question 5 cont'd

3. iterate until the payments is greater than or equal to amount

invested while updating number of days, and customers

4. Keep track of the number of days and the accumulated profit for each day

5. Plot of graph of accumulated profits against number of days

6. Interpolate to get the corresponding day when profit was $100,000 (Hint: Look how to interpolate using MATLAB or Python)

Question 6

Working with ebola data

Steps

1. Read ebola data (xlsread, readtable, ...)

2. Extracted, cases, deaths and dates

3. Get missing dates by generating dates from the first date to the last date in the dataset

Question 6 cont'd

4. Interpolate cases and deaths linearly to get missing values

5. Provide a graph of cases and death against dates

6. Extracted indices (first index) where case values are greater than 100, 500, 1000, 2000, 5000. (Hint: You could use **min** and **find** in MATLAB)

7. Extract cases and dates for the various indices and plot them on the same graph

8. Repeat steps 6 and 7 with deaths

Question 7

Computing average growth rate per day

Steps

1. Use the interpolated deaths and cases matrices from question 6 above
2. Compute growth rate as a percentage for deaths and cases
3. Compute the mean for both growth rates

Question 8

Computing Average Ratio

Steps

1. Use interpolated data from question 6

2. Plot a graph of deaths against cases

3. Indicate the mean ratio of average cases to deaths on the graph

Question 9

Yahoo Finance

Steps

1. Download TLT and SPY from Yahoo Finance for the said period. (https://query1.finance.yahoo.com/v7/finance/download/SPY?period1=1388448000&period2=1441065600&interval=1d&events=history)

(https://query1.finance.yahoo.com/v7/finance/download/TLT?period1=1388448000&period2=1441065600&interval=1d&events=history)

Question 9 cont'd

2. Extract the dates and adjusted closing values for the individual stocks

3. Normalize them so that the first value for each stock is 100

4. Plot the time series for both stocks on the same graph

Question 10

Computing Daily Returns

Steps

1. Compute daily returns for TLT and SPY using the formula given

2. Compute the summary statistics expressed in percentages

Submission Instructions

Submission process:

1. Put the source code **file and data files** in a single folder
2. Name of the folder should be the same as your andrew ID
3. **Zip this folder and attach the zipped file on assignment submission page (CANVAS)**
4. After attaching zipped file, click on "Add Another File" from assignment submission page and **attach your report**
5. Submit your assignment

N.B. This new process will allow us to compile your reports in **Turnitin** to check for plagiarism.

Specific reasons for a submission being classified as incomplete include:

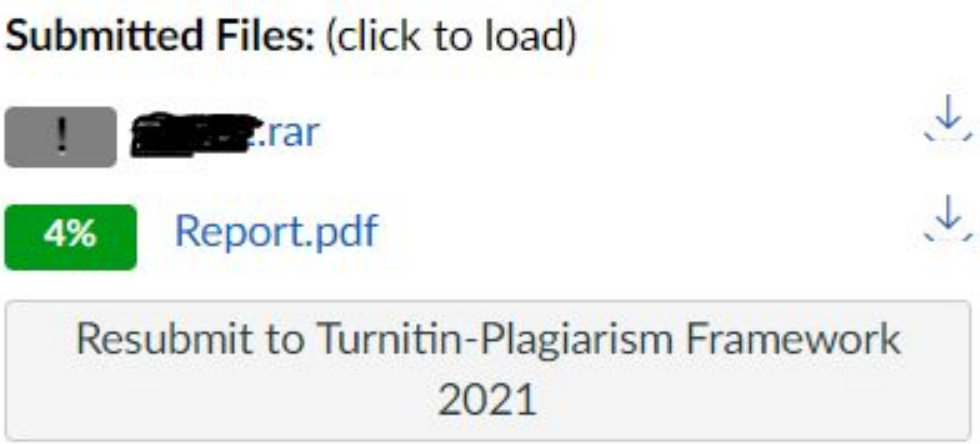
- Failure to correctly name your folder with your Andrew ID, report, and code file with andrewID_DIAML_AssignmentNo. For example, mcsharry_DIAML_Assignment1, mcsharry_DIAML_Assignment2 and mcsharry_DIAML_Assignment3.
- A missing report describing the steps, results, and insights
- A missing dataset required for running the code
- A missing code file such as .ipynb or .m file
- An error in the file path needed to run the code

Submission Instructions Continued

The student is responsible for checking that their submission is complete. Students will lose 10% as for usual late submission even if the submission is repaired during the 24 hours after the deadline has passed, and receive 0 for the assignment if it is not repaired.

The submission deadline is **Eastern Time (ET) on Monday 05, September, 2022 17:59 / Rwandan Time (CAT) on Monday 05, September, 2022 23:59**.

Example Submission



Assignment 0 Demo