Problem Set 1

[This is sample for the write-up structure based on problem set 1, not a solution]

Name: [Your Name]
Names of whom I discussed this problem set with: [name 1], [name 2],

Question 1

Construct the value-weighted market return using CRSP data, replicating the market return time series available in Kenneth French website. Also calculate the equal-weighted market return, and the lagged total market capitalization. Your output should be from January 1926 to December 2018, at a monthly frequency.

Before calculating the portfolio time series, I conduct a series of data cleaning as part of my PS_Q1 function. Next, I describe my data cleaning process and their respective assumptions:

1. **Universe of stocks:** Following Ken French procedure, I restrict the sample to common shares (share codes 10 and 11) and to securities traded in the New York Stock Echange, American Stock Exchange, or the Nasdaq Stock Exchange (exchange codes 1, 2, and 3).

2. **Missing returns:** [explain the calculations you did and justify]

   [The two above are examples, below I provide a more general idea]

3. **Delisting return calculation:** [explain the calculations you did and justify]

4. **Market Capitalization calculation:** [explain the calculations you did and justify]

5. **Portfolio weights:** [explain the calculations you did and justify]

6. **Sample period:** [explain the calculations you did and justify]

7. **Definition of portfolio weights:** [explain the calculations you did and justify]

[based on this description any one should be able to replicate your procedure without having to check the French's website or any other reference]

Question 2

Using the risk-free rate of return from French's website, report the following moments of the market excess returns for both time series (4 decimal digits): annualized return, annualized volatility, annualized Sharpe ratio, skewness, and excess kurtosis. Annualized values should be calculated geometrically. You should be comparing between July 1926 to December 2018, at a monthly frequency.

[Explain your what you report, e.g.:]

The summary statistics are in Table 1 below [this is just an example not the 1926-2018 sample replication]. I report the following five statistics: annualized mean, annualized standard deviation, annualized sharpe ratio, skewness, and excess kurtosis. In Column 1, I report the statistics for the replicated value-weighted market portfolio of stocks calculated in the previous question. In Column 2, I report the statistics for the value-weighted market portfolio of stocks from Ken French's website.

Table 1: Summary statistics

	Replication (1)	French's (2)
Annualized Mean	0.3592	0.3592
Annualized Standard Deviation	0.1865	0.1867
Annualized Sharpe Ratio	1.9260	1.9243
Excess Skewness	0.2009	0.1951
Kurtosis	7.7400	7.7413

From question, we have a times series of value-weighted market returns, namely $\{r_t\}_{t=1}^{T}$. Let the market return from French's website be given by $\{r_t^F\}_{t=1}^{T}$. I compute these statistics as follows:

1. **Sample period:** Monthly from July 1926 to December 2018.

2. **Excess Skewness** [explain the calculations you did and justify] Example: I calculate excess skewness of r_t from the monthly time series directly (no annualization, and no logs) using the full sample.

   [No need to report the formula of skewness because it's a well-know moment, but explain that it over the monthly time series.]

3. **Kurtosis** I calculate kurtosis from the monthly time series directly (no annualization, and no logs) using the full sample.

[No need to report the formula of kurtosis because it's a well-know moment, but explain that it over the monthly time series.]

[The two above are examples, below I provide a more general idea]

4. **Annualized Mean:** [explain the calculations you did and justify (if necessary). You can just report the formula instead.]

5. **Annualized Standard Deviation:** [explain the calculations you did and justify (if necessary). You can just report the formula instead.]

6. **Sharpe Ratio** [explain the calculations you did and justify (if necessary). You can just report the formula instead.]

Question 3

Report (up to 8 decimal digits) the correlation between your time series and French's time series, and the maximum absolute difference between the two time series. It is zero? If not, justify whether the difference is economically negligible or not. What are the reasons a nonzero difference? You should be comparing between July 1926 to December 2018, at a monthly frequency.

[Explain your what you report, e.g.:]

In Table 2 below [this is just an example not the 1926-2018 sample replication], I report the time-series correlation between the replicated value-weighted market portfolio of stocks and the value-weighted market portfolio of stocks from Ken French's website. I also report the maximum difference between the two series.

I limit the sample to be between July 1926 and December 2018.

[Explain your findings, e.g.:]

The difference between the replicated portfolio and the one from French's website is not zero.

[Explain why the difference is not zero, i.e. provide reasons]

Table 2: Correlation and maximum difference

1. Correlation	0.99999391
2. Maximum absolute difference	0.00206886