

# Investment Management

(Course Code: BM51001)

Assignment 3

## Instructors:

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## Instructions for submitting the programming assignments

1. You can write up your answers in a plain text file or with your favorite word processor (e.g., Word, Open Office, or Latex). Your submission, however, should be in PDF format.
2. Please, include Name, ID and Email address in your submission.
3. Your assignment should represent your own effort. However, you are not expected to work alone. It is fine to discuss the problem and try to find solutions together, but each student shall submit solutions separately in the common Github repository<sup>2</sup>.
4. You are advised to solve the problem using Python programming language. The code should be submitted in the well documented Jupyter notebook, that is commented appropriately.
5. Submit a compilable Jupyter notebook and correctly-working copy of the source code and a record of the set of tests that you performed on your program.
6. **Point distribution:** Your program has to work. That means it has to compile correctly, run according to the specifications mentioned in the question, and give correct results. The exact scoring methods the instructor use may vary from assignment to assignment. Generally a program that works will receive at least 50 percent of the points. For full points, each version of your python program must also meet the following criteria:
  - Good design, including good algorithms and documentation
  - Adequate testing of your python code, especially the testing of special cases.
  - We expect you to stick to the "structured approach" in programming. This means using top-down design and modular code.

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<sup>2</sup> Github link will be shared in the official slack channel. You may resubmit multiple times before submission deadline, but only the last submission will be graded.

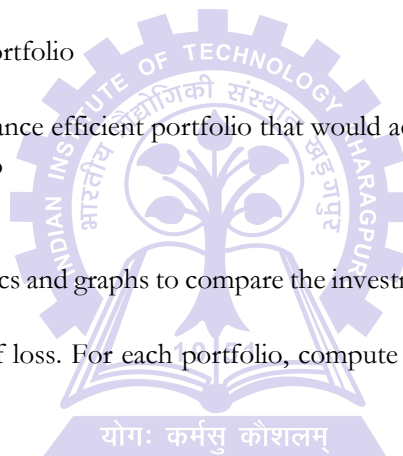
## Assignment question

Points awarded for this assignment : 25 marks

Submission deadline : September 17, 2021

Consider a portfolio of 5 -10 stocks of your choosing from NSE/BSE, for some time horizon of your choosing (minimum one year, maximum 10 years – It's good to have a structural break in your dataset ).

- a) Write a program to compare the risk and return characteristics of investing with an **efficient frontier** with the following portfolios :
  1. Equal-weighted portfolio
  2. Kelly's portfolio
  3. Minimum Variance portfolio
  4. Maximum Sharpe ratio portfolio
  5. **Special case** : Mean-variance efficient portfolio that would achieve the same rate of return as the equally-weighted portfolio
- b) Use the descriptive statistics and graphs to compare the investment returns for the above portfolio.
- c) Next, compare the risk of loss. For each portfolio, compute the investor's maximum drawdown over the time period.



Write a brief report summarizing on the data set used, portfolio construction process, and include the relevant graphs and descriptive statistics to illustrate your work.