**1st Graded Problem Set: "Building a Strategic Portfolio"**

**Total Points:** 100 (with up to 30 points of extra credit available)

If you earn 90 points on the core problem set and an additional 30 points of extra credit, your final score will be capped at 100 points.

**Problem Statement**

Your task is to construct and analyze a **strategic investment portfolio** using a sufficiently large dataset of asset prices (at least five assets). Your analysis should demonstrate, with full transparency, how your own, hypothetical, investment fund determines its strategic allocation (from data acquisition to decision making and monitoring).

Your solution must incorporate and clearly illustrate (at least) the following key concepts from lecture:

* **Jarque-Bera test** for normality
* **Characterization of the investment opportunity set**
* **Efficient frontiers** (both constrained and unconstrained)
* **Tangency portfolio and optimal complete portfolio**
* **Decomposing expected portfolio performance (return and risk)** into systematic and idiosyncratic components
* **Expected portfolio performance vs realized performance**

**Evaluation Criteria**

To achieve a perfect score, your submission must include:

1. A well-thought thru set of questions and data
2. **A well-structured, in-depth analysis (to answer the questions)** that is technically rigorous, clearly written, and intuitive.
3. **A compelling and realistic investement approach**, appropriate for a readership consisting of **finance researchers and hedge fund managers**. Your work should be sophisticated enough to satisfy academics while remaining practical and engaging for practitioners.

**Submission Requirements**

Your submission must include:

* A **maximum** **five-page report** (11pt, including figures, tables, etc.).
* A **maximum of 12 presentation slides**, showcasing all relevant details.
  + **At least 5 slides must be non-Python-based** (motivation, theoretical explanations, visualizations, and insights).
  + **At least 3 slides must be Python-based**, demonstrating implementation and analysis.
* A **fully documented** Python script (or multiple scripts), clearly explaining your methodology and results.

**Extra Credit (Up to 30 Points)**

Lecture slides contain code snippets for selected exercises. You can earn extra credit by producing Python scripts that successfully **replicate all results** from the lecture slides. The tutor gives you access to the respective data files. The topics include:

* **Basic return statistics**
* **Jarque-Bera test**
* **Investment opportunity set**
* **Unconstrained mean-variance frontier**
* **Constrained mean-variance frontier**
* **CAPM regression**
* **Fama-French three-factor regression**
* **Rolling-window CAPM regression**

Each well-executed replication will contribute toward your extra credit score.

**Final Notes**

* Ensure your report and presentation are **concise, well-organized, and professional**.
* Clearly justify all assumptions and methodological choices.
* Use high-quality visualizations to support your analysis.
* The Python code should be clean, efficient, and well-documented.
* We might pick a person by random to present the group’s solution

Good luck! 🚀