ASSIGNMENT 2
Analysis of a mutual fund from its returns

The problem relies on the second part of section 6.7 of the book by Cornuejols, Peña and Tütüncü, starting from the subtitle *"Return-based style analysis"*. You must

(i) summarize the ideas in this second part of section 6.7, demonstrating as far as possible that you understand what you are writing. You don't need to repeat all the formulas, only those useful to make a point.

(ii) implement the approach to evaluate the "style" of a mutual fund of your choice. You will have to:

- choose a mutual fund. For this to work properly, you'll probably need a fund that doesn't use derivative products (pr not too much). There are enough mutual funds out there: e-mail me your choice and I'll let you know if it has already been chosen by another team.
- choose factors, represented by market indices: large-cap, high-growth, fixed-income, small-cap, etc. Perhaps should you also choose factors according to geography, or some other feature ? It depends on your mutual fund of course. Don't take too many factors, say 6 or 8. But if you feel like doing a test with 12 or 20, have fun, but in any case, start with fewer.
- find time series of returns for both the fund and the factors. By the way, when using prices for an assignment, try to use exclusively series adjusted for splits and dividends, otherwise you're comparing apples and pears.

(iii) Solve the model using MATLAB. Perform runs with at least two algorithms, `quadprog` and another MATLAB routine.

(iv) Report your observations, both on the results and the numerical solution. You can come up with interesting questions of your own (especially if you have a clue to the answer!). For example, does the solution of the optimization problem bring difficulties ? Whether the answer is yes or no, can you venture an explanation ? Another example: would

added custom time frame to anwser that

the length of the period under consideration make a difference? Try 12, 24 or even 36 months. What do you observe? Would 52 weeks be better?

Note: I suspect that it will be easier to find prices for exchange-traded funds (ETFs) than for mutual funds. The problem is, ETFs often (and automatically) follow an index, so there are issues about the relevance of this assignment in such a case. If it proves too difficult to find mutual fund prices, we'll see what's to do, but for now, we will stick to mutual funds, not ETFs.

Information:

- You must submit a hard copy report to the secrétariat and your codes on ZoneCours. Put an electronic copy of the report on ZoneCours as well, if possible.
  - The report doesn't have to be electronic. Make sure it's very clean and legible if you write it by hand.
  - The codes must be commented and clean. I need to be able to run an instance easily (leave a prominent example of how to run the main routine)
- The (random) teams will be assigned shortly.
- **Submission date:** No later than 15 h on October 30, 2024 (or earlier, of course).
- You must mention any use of external references (information and code found on the web, other articles, books) For AI-based tools, specify which tools were used, and to what intent. **If you've used nothing but your head, you still need to indicate it.**
- You must specify the joint evaluation of the respective contributions of the team members ("balanced", or percentages otherwise). It cannot be super precise, that's not the goal; I just want everybody working seriously and contributing.