Submit your work on Catcourses by April 14th at 11:59pm

Please be aware that in this homework, your approach and your justifications will be given **a lot** more importance than your final results. This means that you should think about how you will present and explain your work so that what you turn in makes sense, even if it is read by someone unfamiliar with the problem. This is a good training for your final report project.
Read entirely the homework assignment first !

Groups are the same as the ones for the final project BUT the group leader should change. In each you will have to assign:

- A group leader (manages communication within the group)
- A work submission leader (submits the group work on behalf of the group)

1. Identify a real system that could be investigated as an optimization problem (read all questions below). Be as much precise as you can in your hypothesis, and the limitations of the model. **Be creative and ambitious !** Codes are already given (and you don't have to start from scratch), we expect you to try an elaborated problem.
2. Write your system eitehr in the quadratic form $\min_{x\in K} \frac{1}{2}x^\intercal Ax - b^\intercal x$, or in the linear form $\min_{x\in K} b^\intercal x$, and define what are n, $A \in \mathbb{R}^{n\times n}$, $b \in \mathbb{R}^n$, $K \subset \mathbb{R}^n$. You may consider this as a discrete version of your problem. Explain the approximations you made in your model to fit this form.
3. Check if your defined set K is convex, if your function J is convex (or strictly convex) over K, and write the optimal conditions to find the minimum.
4. Implement your model and compute the minimum. Precise your choices of numerical method. Use the codes given and discussed in the class. Bonus points if you decide to try other numerical methods not discussed in class, as long as they are fairly well explained and presented.
5. Describe what your model does well and what it does poorly relative to the real system.
6. Submit all your answers **in a single .ipynb** on Catcourses your answers under the assignment `Homework 7 (group)`. The work submission leader of each group is responsible for the submission.