Optimization and Analytics

Bachelor in Data Science and Engineering

First Homework: Linear and Discrete Models (Topics 1, 2)

Deadline: November 3, 2022 at 23:00
Upload to Aula Global: notebook (including html) and any data used

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General Objective

- Find and describe a realistic problem where the decision making process requires of the formulation of a linear optimization model
- The problem must have at least 20 decision variables and more than 3 non-trivial constraints
- The bigger the problem, the better

Evaluation

a) (*2 points*) Formulate the problem as a linear optimization model (general formulation). Identify the model sets, parameters, variables, objective function and constraints.

b) (*3 points*) Implement the model in a notebook (preferably using Pyomo, but not mandatory) and solve it for an input based on real (or realistic) world data. Interpret the solution.

c) (*1 point*) Compute the sensitivities associated with each constraint, and interpret their values.

d) (*4 points*) Modify the problem in a) to impose some logical and conditional constraints that require the use of binary or integer variables. The more integer variables or constraints, the better. Implement and solve this new model and interpret the results.

Remember the deadline: November 3, 2022 at 23:00

IMPORTANT: Present the code in a Jupyter notebook and name it as "Surname-Name-HW1.ipynb". Upload also the corresponding complied version "Surname-Name-HW1.html", and the datasets that are needed (if any) to reproduce your results.