SA463 • Operations Research in Action Fall 2024 • Uhan

**Project 2 – Feedback**

* I try my best to provide detailed feedback, but I cannot catch everything. Try to generalize my feedback to other places in your report where you think it is appropriate.
* **“Optimal” is a bad word.** In general, use it only in a technical context (e.g., “optimal value”, “optimal solution”).
	+ “Optimal” is imprecise as an adjective unless you define the objective function. For example, instead of:

	*The goal of this project was to find an optimal lineup for Team Canada.*

	you could say:

	*The goal of this project was to find a lineup for Team Canada that maximizes the total adjusted plus-minus values of the players selected, subject to constraints related to the physical rating and number of players allowed on the court.*
	+ “Most optimal” doesn’t make sense – the word “optimal” already includes the notion of being the most suitable or most desirable thing.
	+ If you want to address the notion of optimizing something in a general sense, use words like “improve” or “enhance” instead. For example, instead of:

	*Team Canada is trying to optimize their performance on the court.*

	you could say:

	*Team Canada is trying to improve their performance on the court.*
* Use the standard convention for formatting an optimization model. You should define sets, parameters, and decision variables first. Then, provide the objective function and constraints in mathematical symbols. Afterwards, describe the objective function and constraints in words.

For example:

**Sets.**

$$\begin{matrix}K&=set of cake types\\I&=set of ingredients\end{matrix}$$

**Parameters.**

$$\begin{matrix}p\_{k}&=unit profit for cake type k&for k\in K\\a\_{i,k}&=units of ingredient i used in cake type k&for i\in I, k\in K\\b\_{i}&=units of ingredient i available&for i\in I\end{matrix}$$

**Decision variables.**

$$x\_{k}=number of type k cakes to bake for k\in K$$

**Objective function and constraints.**

$$\begin{matrix}maximize&\sum\_{k\in K}^{}p\_{k}x\_{k}&&(1)\\subject to&\sum\_{k\in K}^{}a\_{i,k}x\_{k}\leq b\_{i}&for i\in I&(2)\\&x\_{k}\geq 0&for k\in K&(3)\end{matrix}$$

 The objective function (1) is to maximize the total profit. Constraint (2) ensures that the amount of each ingredient used does not exceed the amount of each ingredient available. Constraint (3) ensures that nonnegative numbers of cakes are baked.

* When using the equation editor, use the **alignment features** (right click on the matrix for options) and **text mode** (in the Equation ribbon, on the right).
* Include details on the computational environment and programming language you used to solve your models.
	+ Computational environment: AMD Ryzen PRO 4750U CPU at 2.1 GHz with 16 GB RAM running Microsoft Windows 11 (fill in the details of your own computer)
	+ Regression: R programming language
	+ Optimization: Pyomo, a Python-based optimization modeling language, and the GLPK optimization solver

I was unclear about this in the Writing about OR lessons – my apologies.