Introduction to Optimization Through the Lens of Data Science Course Exercises

Exercises - Section 4: Lecture 11 - Notation Subscripts Summations – Part 2

Suppose we have the following notation for a rental car fleet planning model:

ENGLISH	MATH	GUROBIPY	
Car types: $i=1$ (small), $i=2$	i	i	
(midsize), $i=3$ (luxury), $i=4$			
(SUV), i=5 (minivan)			
Forecasted rental demand for	D_i	D = {i: d for i in range(1, 6)}	
car type <i>i</i> (forecasted data)			
Cost per car for car type i	C_i	C = {i: c for i in range(1, 6)}	
(known data)			
Number of cars of type i to	x_i	x = model.addVars(range(1, 6),	
purchase (variable)		name="x")	

Fill in the table below, using the notation above to describe each of the following quantities mathematically and in Python.

QUESTION	MATH	GUROBIPY
1. Forecasted rental demand for		
luxury cars		
2. Forecasted rental demand for		
SUVs		
3. Cost per SUV		
4. Number of small cars to		
purchase		
5. Forecasted demand for		
midsize cars and minivans		
6. Forecasted rental demand for		
cars (not SUVs or minivans)		
7. Total cars to purchase above		
midsize		
8. Total vehicles to purchase		
9. Cost of midsize cars purchased		
10. Cost of SUVs purchased		
11. Cost of midsize cars and		
minivans purchased		
12. Cost of SUVs and minivans		



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13. Cost of all cars (not SUVs or	
minivans) purchased	
14. Cost of all vehicles purchased	
15. Forecasted purchase cost per	
rental of SUVs	
16. Forecasted purchase cost per	
rental of minivans	
17. Average purchase cost over	
all SUVs and minivans	
18. Average purchase cost of all	
cars (not SUVs or minivans)	
19. Forecasted purchase cost per	
rental over all cars (not SUVs or	
minivans)	
20. Forecasted purchase cost per	
rental over all vehicles	

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