Introduction to Optimization Through the Lens of Data Science Course Exercises

Exercises - Section 1: Lecture 4 – Binary Modeling - Questions

Suppose there are variables defined as follows:

English	Math	gurobipy
For each holiday, will the	z_k	import gurobipy as gp
company run a sale?		from gurobipy import GRB
(1=yes, 0=no)		J = get_holiday_set()
		m = gp.Model()
		z = m.addVars(J,
		vtype=GRB.BINARY)

Assume that in both math and gurobipy, holidays are indexed by their first letter, so z_l and z[1] are the mathematical and gurobipy terms for the variable for Labor Day, z_m and $z\ [m]$ are for Memorial Day, etc.

Fill in the following table with mathematical and gurobipy constraints that match the English constraint.

En	glish	Math	gurobipy
1.	The company must run a sale on both		
	Labor Day and Memorial Day.		
2.	The company must run a sale on		
	either Memorial Day or July 4 or		
	both.		
3.	The company must run a sale on		
	either Labor Day or Thanksgiving, but		
	not both.		
4.	The company must run a sale on both		
	or neither of New Year's or July 4		
	(i.e., the decision of whether to run a		
	sale must be the same for those two		
	holidays).		
5.	The decisions of whether to run a sale		
	on Labor Day and July 4 must be		
	opposite.		
6.	If the company runs a sale on		
	Presidents Day, then it must also run		
	a sale on July 4.		

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Suppose there are variables defined as follows:

English	Math	gurobipy
For each database, is its	y_i	import gurobipy as gp
primary storage location		from gurobipy import GRB
the West Coast server or		
the East Coast server		J = get_database_storage()
(1=West, 0=East)?		
		m = gp.Model()
		y = m.addVars(J, vtype=GRB.BINARY)

Assume that in both math and gurobipy, databases are indexed by their first two letters, so y_{tr} and y[tr] are the mathematical and gurobipy terms for the variable for the trucking database, z_{pu} and z[pu] are for the purchasing database, etc.

Fill in the following table with mathematical and gurobipy constraints that match the English constraint.

En	glish	Math	gurobipy
7.	Either the Trucking database or the		
	Equipment database (or both) must be		
	stored primarily on the West Coast.		
8.	The Purchasing database and the		
	Facilities database must be stored on		
	the same server.		
9.	If the Customer database is stored on		
	the West Coast, then the Purchasing		
	database must also be stored on the		
	West Coast.		
10.	Either the Trucking database or the		
	Purchasing database (but not both)		
	must be stored primarily on the West		
	Coast.		
11.	The Customer database and the		
	Payroll database must be stored on		
	different servers.		
12.	The HR and Payroll databases must		
	both be stored in the West Coast.		

NOTES:		

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