MATH3202 Operations Research & Mathematical Planning 2024

Assignment 2 – Integer Programming

This assignment is due by 3pm on Monday, April 22nd and is worth 20% of your final grade. You can do this assignment in group of up to three, with a single submission.

Your job with the Operations Research consulting company is going well. Your boss would like you to continue to work with Teal Cow Dairy to plan their future expansions. Communications to you from their team will be provided through Blackboard.

The first two communications for this assignment will appear at 12pm on Thursday, March 28th with the final communication appearing at 12pm on Monday, April 15th.

You will need to prepare a report for your boss and a presentation for the client:

Section A – Report to your boss, to include:

- A general mathematical formulation for the problem, including definitions of sets, data, variables, objective function, and constraints. *8 marks*
- A Python file with the problem modelled for Gurobi. This should be easy to relate back to the formulation. Your boss will attempt to execute this model. *4 marks*

Section B – Report to the client, to include:

- Written responses that clearly and concisely address the needs of the client given through the communications. *5 marks*
- Brief insights into the solution, such as identifying key constraints or explaining the effects on costs of additional constraints provided by the client. *3 marks*

Submit your report and Python file via Blackboard, using PDF for the report (saved from Word or created in LaTeX). You must join a group on Blackboard before submitting your assignment but it can be a group of one.

Each student will receive separate data from the client but a group of two or three needs only consider one data set in the report.

Grading Criteria

Section A				
Marks	**0**	**1**	**2**	**3**
Sets	Incorrect or missing description of sets	Correctly describes sets		
Data	Missing some or all descriptions of data	Correctly describes all data		
Variables	Incorrect or missing description of variables	Correctly describes most variables	Correctly describes all variables	
Objective function	Incorrect or missing description of objective function	Correctly describes objective function		
Constraints	Missing many or all descriptions of constraints	Correctly describes some constraints	Correctly describes most constraints	Correctly describes all constraints.
Python code	There is a poor relationship between Python code and mathematical formulation	Python code clearly matches mathematical formulation		
Execution	Python code fails to run	Python code runs but gives incorrect answer	Python code runs and gives correct answer	
Comments	Python code has few or no comments	Python code is clearly commented		
Section B				
Marks	**0**	**1**	**2**	**3**
Response to communications	Fails to address any of the client questions	Correctly addresses one client question	Correctly addresses three client questions	Correctly addresses all client questions
Insights into the solution	Incorrect or missing insights into solution	Identifies some important factors that affect the solution.	Identifies important factors that affect the solution	Provides insight and thoroughness in identifying factors that affect the solution
Written response	Poorly written response with frequent errors in grammar, spelling or technical language; and/or unnecessarily long	Concisely addresses needs of client with few errors in writing	Excellent proficiency in clearly and concisely addressing needs of client	