

Assignment 1 – Linear Programming

This assignment is due by 3pm on Monday, March 18th and is worth 10% of your final grade. You can do this assignment in a group of up to three, with a single submission.

You have just started your first job with an Operations Research consulting company and you are keen to impress your boss who has a good technical understanding of OR. The first project you are assigned is for Teal Cow Dairy, a company that is looking to optimise its production of milk and other dairy products. Communications to you from their team will be provided through Blackboard.

The first communication will appear at 12pm on Thursday, February 29th with the final communication appearing at 12pm on Tuesday, March 12th.

You will need to prepare a report which includes two main sections:

Section A – Report to your boss

- A general mathematical formulation of the problem, including definitions of sets, data, variables, objective function and constraints. *7 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. *5 marks*

Section B – Report to the client

- 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 of the additional requirements and options on costs. *3 marks*

Submit your report and Python files 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
Sets	Incorrect or missing description of sets	Correctly describes sets	
Data	Missing some or all descriptions of data.	Correctly describes most data	Correctly describes all data
Variables	Incorrect or missing description of variables	Correctly describes variables	
Objective function	Incorrect or missing description of objective function	Correctly describes objective function	
Constraints	Missing many or all descriptions of constraints	Correctly describes most constraints	Correctly describes all constraints.
Python code	There is no relationship between Python code and mathematical formulation	Python code mostly matches 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 two client questions	Correctly addresses all client questions
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	
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