W
WARWICK
THE UNIVERSITY OF WARWICK

Optimisation Models

Term One 2023

WARWICK BUSINESS SCHOOL

20% Group Assignment

This is a strict limit not a guideline. Any piece submitted with more words than the limit will result in the excess not being marked.

AI is prohibited read more below.

Your task:

You are given a set of ten linear programming problems. Formulate these problems as **linear** programming models and solve the models by using Python Pyomo Solver.

DO NOT USE INTEGER VARIABLES!!! **Let all variables to be continuous.**

IMPORTANT: a computer program will be used for a preliminary check of your answers, therefore, read carefully and strictly follow the instruction below.

Load file "AssignmentTemplate2023.xlsx" from *my.wbs.ac.uk.* web-page. Use this file to submit your solutions to the problems.

Enter group number into the corresponding field on the worksheet "Results".
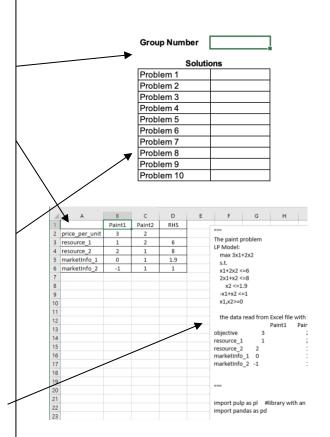
Set **input data** for your problems on worksheets "Problem1",…, "Problem10".

Solve your problems by using **Python** Pyomo Solver. The data in your Python codes must be read from the tables in the worksheets. Enter the objective functions' values in the table in the worksheet "Results". All answers should be rounded to two decimal places (use *Round*(xxxxx, 2) function. For example round(12.378643) becomes 12.38. You must submit 12.38).

Independently of the context of your problem, allow your decision variables to be continues, i.e., DO NOT USE *integer* **or** *binary* **variables.**

Paste your **models** and **Python** codes into **text boxes** in the corresponding worksheets.

DO NOT protect your workbook or worksheets.

Group Number [   ]

Solutions

Problem 1	
Problem 2	
Problem 3	
Problem 4	
Problem 5	
Problem 6	
Problem 7	
Problem 8	
Problem 9	
Problem 10	

	A	B	C	D	E	F	G	H
1		Paint1	Paint2	RHS				
2	price_per_unit	3	2					
3	resource_1	1	2	6				
4	resource_2	2	1	8				
5	marketInfo_1	0	1	1.9				
6	marketInfo_2	-1	1	1				
7								

"""
The paint problem
LP Model:
    max 3x1+2x2
    s.t.
    x1+2x2 <=6
    2x1+x2 <=8
       x2 <=1.9
    -x1+x2 <=1
    x1,x2>=0

the data read from Excel file with

	Paint1	Pair
objective	3	
resource_1	1	
resource_2	2	
marketInfo_1	0	
marketInfo_2	-1	

"""

import pulp as pl   #library with an
import pandas as pd

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REMEMBER THAT ALL TEAM MEMBERS MUST SUBMIT <u>PEER ASSESSMENT</u>
SUBMISSION DEADLINE: 12:00 (UK time) Tuesday 21st November 2023

[Assignment Preparation](#) (found in your Masters Student Handbook Section 6.2b)

[Word Count Policy and Formatting](#) (found in your Masters Student Handbook Section 6.2c)

[Guidelines for Online Submission](#) (found in your Masters Student Handbook Section 6.2e)
Your assignment cover sheet can be downloaded from this page.

[ChatGPT and AI](#) (found in your Masters Student Handbook Section 6.1e)

Please agree in advance ONE person in your group, a group representative, who will submit the final document.

Once a document has been submitted by the group representative no other members within the group will be able to submit anything for the assessment.

Your group representative must submit your completed assignment online via my.wbs. The submission deadline is visible on all group members my.wbs home page. Submission dates and times are serious deadlines which must be strictly adhered to. Your group representative must submit your document by 12:00 midday (UK time), if it is submitted later than 12:00:00 your group submission will be late and penalty marks will be incurred.

A completed assignment coversheet must be included as the first page of your groups script (see section 6.2b/e).

Do not include any of your group members names anywhere in the assignment, all marking is anonymous.

Please include your Group Name in the header on every page and number all pages in the centre footer, your document should be in A4 page layout, Arial font size 11pt with 1.5 line spacing and 2.54 margins (see section 6.2c).

My.wbs will only allow your group representative to upload one file.

Please submit your group work as a PDF, we will not accept PDF files of scanned documents. Your group should create the assignment in the groups chosen package (e.g., Word, PowerPoint), then convert it straight to PDF. Please ensure that your group create the PDF in advance of the deadline as technological problems will not normally be accepted as mitigating circumstances for late submission.

Please name your file as your Group Name underscore Module Code, e.g., GroupName_IB9XXX.

When submitting your group assignment your group representative will need to confirm that the work being submitted is your groups, that it has been referenced and that your group understand the University Regulations with regard to Academic Integrity.

The University recognises an increasing number of technologies such as Artificial Intelligence and that they may be applicable in your completing this assessment. The assessment brief sets out specific requirements or restrictions, and your student handbook has further guidance and advice, see section 6.1e.

Your group are reminded that the inappropriate use of such a technology may constitute a breach of University policy, such as the Proofreading Policy or Regulation 11 (Academic Integrity). If your group breach these policies, it may have significant consequences for your studies. Please make sure you all read and understand the assessment brief and how AI may or may not be used.

If a generative AI or similar is permitted and has been used your group **must** make clear why such a tool or service was used, what it was used for and the representative will be obliged to confirm that you all take joint intellectual ownership of any submitted work. As appendices, and as part of your submitted work, your group must provide screenshots of the question and the AI-generated response, alongside an explanation of how the content has been utilised, and note the relevant reference alongside each screenshot.

When your group submit the representative must complete (physically or electronically) a declaration. This requires the explanation of the use of any AI. Failure to disclose at the point of submission may be prejudicial in any later investigations should they arise.

You MUST NOT use any generative Artificial Intelligence in this assessment unless specifically authorised for reasonable adjustments. You MAY use non-generative tools such as a spell-check, basic grammar check (non-generative), calculator or similar. If you have any doubts about a tool or service you plan to use, please contact the module leader.

The group should double check that the correct file is being submitted. Your group are responsible for ensuring that the final version of your work is submitted.

By submitting the assignment on behalf of the group, your group representative will need to confirm and agree with the following statement:

"I declare that this work is being submitted on behalf of my group, in accordance with the University's Regulation 11 and the WBS guidelines on plagiarism and collusion. All external references and sources are clearly acknowledged and identified within the contents.

No substantial part(s) of the work submitted here has also been submitted in other assessments for accredited courses of study and if this has been done it may result in us being reported for self-plagiarism and an appropriate reduction in marks may be made when marking this piece of work."

Once your group representative declares agreement with the statement, it will not be possible to claim that your group were unaware of these requirements in the event that the work is subsequently suspected of Academic Misconduct.

After submitting, please check the correct file has successfully uploaded, by opening the document link on the submission page and scrolling through the entire document.

Your group representative can retract the submission before the deadline to upload an updated file, the retraction button can be found in the same place your group representative submitted your group assignment. Please upload the new document before the deadline, submitting after the deadline will attract late penalties.

End