OPERATIONAL RESEARCH

Assignment 1

Send Solution to: operationalresearchg2@gmail.com

With Subject: "OR Assignment1"

In the text message: Write your name & your section

Deadline: 20/5/2021 at 11:59 PM

Problem (1): A cargo plane has three compartments for storing cargo: front, centre and rear. These compartments have the following limits on both weight and space:

Compartment	Weight capacity (tonnes)	Space capacity (cubic meters)
Front	10	6800
Centre	16	8700
Rear	8	5300

Furthermore, the weight of the cargo in the respective compartments must be the same proportion of that compartment's weight capacity to maintain the balance of the plane. The following four cargoes are available for shipment on the next flight:

Cargo	Weight (tonnes)	Volume (cubic metres/tonne)	Profit (£/tonne)
C_1	18	480	310
C_2	15	650	380
C_3	23	580	350
C_4	12	390	285

Any proportion of these cargoes can be accepted. The objective is to determine how much (if any) of each cargo C1, C2, C3 and C4 should be accepted and how to distribute each among the compartments so that the total profit for the flight is maximised. Formulate the above problem as a linear program?

Problem (2): A farmer has recently acquired a 110 hectares' piece of land. He has decided to grow Wheat and barley on that land. Due to the quality of the sun and the region's excellent climate, the entire production of Wheat and Barley can be sold. He wants to know how to plant each variety in the 110 hectares, given the costs, net profits and labour requirements according to the data shown below:

Variety	Cost (Price/Hec)	Net (Price/Hec)	Profit	Man-days/Hec
Wheat	100	50		10
Barley	200	120		30

The farmer has a budget of US$10,000 and availability of 1,200 man-days during the planning horizon. Find the optimal solution and the optimal value " solve using the graphical solution" ?

Problem (3): Use the Regular Simplex Method to find the maximum value of the Objective function $Z = 3x_1 + 2x_2 + x_3$

subject to the constraints:

$4x_1 + x_2 + x_3 = 30$

$2x_1 + 3x_2 + x_3 \leq 60$

$x_1 + 2x_2 + 3x_3 \leq 40$

$2x_1 + 3x_2 + x_3 \leq 60$

Where

$x_1, x_2, x_3 \geq 0$