Linear Programming – Q7: Formulating as LP problem [3 marks](15/6/21)

Exam Boards

OCR : -

MEI: MwA

AQA: -

Edx: -

A company has 3 warehouses (A,B & C) producing identical items. These have to be delivered to 4 shops, in such a way as to minimise the total transportation cost. These costs are shown in the table below, together with the number of items available at each warehouse (the 'supply'), and the number of items required by each shop (the 'demand'). The aim is to decide how many items each warehouse should deliver to each shop. Formulate this as a linear programming problem.

	demand:	10	11	8	6
supply:		1	2	3	4
12	A	7	4	5	2
13	B	3	6	4	6
10	C	8	3	4	5

[3 marks]

Solution

With A1, A2, ... , C4 being non-negative integers, so that A1 is the number of items transported from warehouse A to shop 1:

Minimise $P = 7A1 + 4A2 + \cdots + 5C4$, [1 mark]

subject to the following constraints:

$A1 + A2 + A3 + A4 = 12$

$B1 + B2 + B3 + B4 = 13$

$C1 + C2 + C3 + C4 = 10$ [1 mark]

$A1 + B1 + C1 = 10$

$A2 + B2 + C2 = 11$

$A3 + B3 + C3 = 8$

$A4 + B4 + C4 = 6$ [1 mark]