A Transportation Problem

We have:

- two factories: F_1 and F_2
- Retail Outlets: $R_1, R_2, \ldots, R_{12}$

Assume:

F_i can produce a_i tons / week
(a_i is the capacity)

R_i weekly demands for b_j tons.

c_{ij} is the cost of shipping
one ton from factory F_i
to outlet R_j

Problem: Determine x_{ij} which is the number of tons that are shipped from factory F_i to retail outlet R_j, so that the total cost is minimized and all requirements are met.

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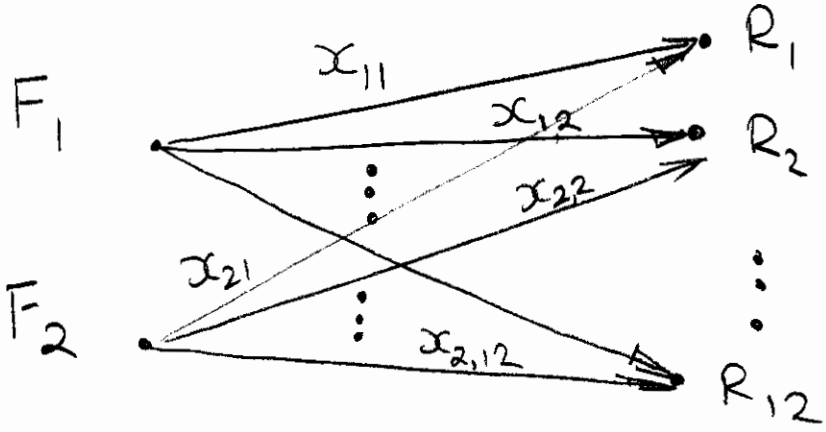

Cost is $\underbrace{\sum_{J=1}^{12} C_1 x_{1,J}}_{\text{first factory}} + \underbrace{\sum_{J=1}^{12} C_2 x_{2,J}}_{\text{second factory}}$

We want to minimize:

$$\min \sum_{ij} C_{ij} x_{ij}$$

subject to:

$$\sum_{J=1}^{12} x_{ij} \leq a_i, \quad i = 1, 2$$

↑ do not exceed capacity of the factory.

$$\sum_{i=1}^{2} x_{ij} \geq b_j, \quad J = 1, 2, \ldots, 12$$

↑ meet or exceed demand.

$x_{ij} \geq 0$ ← cannot bring product back from retailer.

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All constraints are linear functions. Trans-

Thus, the problem is known as being a linear programming problem.