

DM204 - Assignment N. 2

Exercise 1: Production Planning – Warehousing

A company manufactures multiple products. The products are seasonal with demand varying weekly, monthly, or quarterly. To use its work force and capital equipment efficiently, the company wishes to “smooth” production, storing pre-season production to supplement peak-season production. The company has a warehouse with fixed capacity R that it uses to store all the products it produces. Its decision problem is to identify the production levels of all the products for every week, month, or quarter of the year that will permit it to satisfy the demands incurring the minimum possible production and storage costs.

We can view this warehousing problem as a multicommodity flow problem defined on an appropriate network. For simplicity, consider a situation in which the company makes two products and the company needs to schedule its production for each of the next four quarters of the year. Let d_j^1 and d_j^2 denote the demand for products 1 and 2 in quarter j . Suppose that the production capacity for the j th quarter is u_j^1 and u_j^2 , and that the per unit cost of production for this quarter is c_j^1 and c_j^2 . Let h_j^1 and h_j^2 denote the storage (holding) costs per unit of the two products from quarter j to quarter $j + 1$.

Model the warehousing problem by means of the multicommodity flow model and represent graphically the network in the two products four periods case.

Exercise 2

Model by MIP the following scheduling problems:

- $Qm \mid p_j = 1 \mid \sum h_j(C_j)$, h being any nondecreasing function.
- $Rm \mid \mid \sum C_j$
- $1 \mid prec \mid \sum w_j C_j$