

Production planning

Variables:

x_{ij} the amount of product i in month j to be produced

y_{ij} the amount of product i in month j to be sold

t_{ij} the amount of product i in month j to be stored

$a_{ij} = 1$ if product i in month j is produced (binary)

Objective:

$$\max \sum_{ij} (price_i y_{ij} - prodcost_i x_{ij} - storecost_i t_{ij} - actcost_i a_{ij})$$

Subject to:

$$\begin{aligned} x_{ij}, y_{ij}, t_{ij} &\geq 0 & \forall i, j \\ \sum_i \frac{x_{ij}}{maxquota_i} &\leq days_j & \forall j \\ \sum_i t_{ij} &\leq 800 & \forall j \\ y_{ij} &\leq demand_{ij} & \forall i, j \\ minbatch_i a_{ij} &\leq x_{ij} & \forall i, j \\ \frac{x_{ij}}{maxquota_i days_j} &\leq a_{ij} & \forall i, j \\ t_{i,j-1} + x_{ij} &= y_{ij} + t_{ij} & \forall i, j \\ t_{i0} &= 0 & \forall i \end{aligned}$$

The last two constraint can be written directly as

$$t_{ij} = \sum_{k=1}^j x_{ik} - y_{ik}$$