

Optimization. A first course on mathematics for economists

Problem set 6: Linear programming

Xavier Martinez-Giralt

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6.1 A company produces two goods x and y . The production technology for each good is described as follows

- one unit of good x requires
 - $4m^2$ of storage space
 - 5 units of raw materials
 - 1 minute of production time
- one unit of good y requires
 - $5m^2$ of storage space
 - 3 units of raw materials
 - 2 minutes of production time

The company has

- premises of $1500m^2$ to store the products before their distribution,
- 1575 units of raw materials daily,
- works 7 hours per day,
- at the end of the day the whole production is shipped out.

Finally, the selling unit prices of the goods are 13 € and 11 € for good x and y respectively.

- (a) Formulate the revenue maximizing daily production of goods x and y
- (b) Solve the problem graphically,
- (c) Solve the problem analytically,
- (d) Solve the problem using the simplex algorithm,
- (e) Formulate the dual problem

6.2 Solve

$$\begin{aligned} \min_{y_1, y_2} & 6y_1 + 8y_2 \text{ s.t.} \\ & 2y_1 + y_2 \geq 3 \\ & y_1 + 2y_2 \geq 2 \\ & y_1 \geq 0, \quad y_2 \geq 0 \end{aligned}$$