

Linear Optimization - WS 2017/2018

Exercise 2

Exercise 1

A shoe factory wants to produce a model of a women's shoe and one model of a men's shoe. The following table shows the necessary and the available resources:

	Women's Shoes	Men's Shows	available
Production Time [h]	20	10	8000
Mechanical Manipulation [h]	4	5	2000
Leather demand [qdm]	6	15	4500

The employees and machines are supposed to be used as profitable as possible. The net profit is 16 MU (monetary unit) per pair of the women's shoe and 32 MU per pair of the men's shoe.

- Formulate the problem of determining a production plan with maximum profit as a linear program and reformulate into standard form.
- State a lower and an upper bound as well as possible for the maximum profit.

Exercise 2

Three feedings stuffs A , B , C containing two indispensable nutrients N_1 , N_2 are to be used at the lowest costs for animal breeding. At least 12 units of nutrient N_1 and 8 units of nutrients N_2 are required. The costs for the feedings stuffs are 16 MU, 4 MU, 8 MU, resp., per unit, containing nutrients N_1 and N_2 , resp., in the following concentrations:

Feeding Stuff	A	B	C
Amount N_1	20%	40%	10%
Amount N_2	30%	-	20%

Formulate the linear optimization problem.

Exercise 3

Write the follownig problem as a linear program:

a) $\min_x \max_{i=1, \dots, m} |a_i^T x + b_i|$

b) $\min_x \sum_{i=1}^m |a_i^T x + b_i|$

$x \in \mathbb{R}^n$, $a_i \in \mathbb{R}^n$, $b_i \in \mathbb{R}$, $i = 1, \dots, m$.

You do not have to hand in these exercises, there will be a discussion in the tutorials.