Homework for Constraint-based Modeling of Cellular Networks
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Homework should be sent to Anika Küken (ankueken@uni-potsdam.de)

Exercise

Solving linear problems

A store has requested a manufacturer to produce pants and sports jackets.

For materials, the manufacturer has $750m^2$ of cotton textile and $1000m^2$ of polyester. Every pair of pants (1 unit) needs $1m^2$ of cotton and $2m^2$ of polyester. Every jacket needs $1.5m^2$ of cotton and $1m^2$ of polyester. The price of the pants is fixed at 50€ and the jacket 40€. What is the number of pants and jackets that the manufacturer must give to the stores so that these items obtain a maximum sale?

a. Write down the LP model of the problem above in standard form.
b. Use the graphical method to solve the LP.
c. Use the simplex algorithm to solve the LP.
d. Use linprog() function in MATLAB to solve the LP**.**

Homework

Maria has an online shop where she sells hand made paintings and cards. It takes her 2 hours to complete one painting and 1 hour to make a single card. She also has a day job and makes paintings and cards in her free time. Thus, she cannot spend more than 20 hours a week to make paintings and cards. Additionally, she should make not more than 12 paintings and cards in total per week. She makes a profit of 50€ on paintings and 30€ on each card.
How many paintings and cards should she make each week to maximize her profit?

a. Write down the LP model of the problem above in standard form. (3 points)
b. Use the graphical method to find the number of painting and cards that maximize Marias profit. What is the maximum profit Maria can achieve? Create a MATLAB figure showing the solution of the graphical method. (2 points)
c. Use the simplex algorithm to solve the LP (simplex tableau). (5 points)
d. Write down the initial tableau for the LP above with the additional constraint that Maria has to make at least 5 cards per week? (1 point)
e. Use linprog() function in MATLAB to solve the LP with and without the additional constraint on the number of cards produced per week. (4 points)