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Optimization

WS 2013/14

Exercises 0

1. Install gurobi

   (a) go to the webpage http://www.gurobi.com/ and download the gurobi solver

   (b) install it on your computer

   (c) try to run the example (coins.lp)

   Under "Quick Start Guide" you will find some useful tips.

2. $A, B, C \in R^{m \times n}$. Which of the following statements are always true?
   $\square AB = BA$
   $\square (AB)C = A(BC)$

3. $\lambda \in \mathbb{R},\ v \in \mathbb{R}^n,\ S \in \mathbb{R}^{m \times n}$
   Which of the following statements are always true?
   $\square\ \lambda Sv = S\lambda v$
   $\square\ \lambda Sv = \lambda vS$
   $\square\ \lambda Sv = Sv\lambda$
   $\square\ \lambda Sv = (\lambda S)v$
   $\square\ \lambda Sv = \lambda(Sv)$
   $\square\ \lambda Sv = v\lambda S$

4. Where do the results of the following examples live in (in $\mathbb{R}$, in $\mathbb{R}^n$, in $\mathbb{R}^{m \times n}$, in $\mathbb{R}^{m' \times n}$ etc.)?

   - λS
   - λv
   - Sv
   - $v^T v$
   - $P \in \mathbb{R}^{m' \times n'}$: SP

5. Reformulate $S(\lambda v + w)$

6. If $A \in R^{m \times n}$, where does A^T live in and if $A = \begin{pmatrix} a_{11}, & \dots & , a_{m1} \\ \vdots & & \vdots \\ a_{1n}, & \dots & , a_{mn} \end{pmatrix}$ how does A^T look like?

7. What is always true?
   $\square (AB)^T = A^T B^T$ or $\square (AB)^T = B^T A^T$ or $\square$ both
   $\square (AB)^{-1} = A^{-1} B^{-1}$ or $\square (AB)^{-1} = B^{-1} A^{-1}$ or $\square$ both

8. - What is the rank of a matrix?
   - What does it mean if a matrix is non-singular?