CS 525 - Fall 2011 - Homework 5*

assigned 10/12/11 - due 10/19/11

1. Do Exercise 4-5-2.
2. Do Exercise 4-6-4.
3. Consider the LP:

$$\begin{array}{ll} \text{minimize} & c^T x \\ \text{subject to} & \sum_{i=1}^{n} x_i = 1 \\ & x \geq 0 \end{array}$$

   (a) Write down the dual problem

   (b) Write down the KKT conditions.

   (c) Find an optimal primal and dual solution for the problem and write down the optimal value of the LP.

4. Recall our friends the ℓ_1 and ℓ_∞ norms:

$$\|x\|_1 = \sum_{k=1}^{n} |x_k| \qquad \|x\|_\infty = \max_{1 \leq k \leq n} |x_k|$$

   Show that

$$\|x\|_\infty = \max_z x^T z \;\text{ subject to } \|z\|_1 \leq 1$$

   and

$$\|x\|_1 = \max_z x^T z \;\text{ subject to } \|z\|_\infty \leq 1\,.$$

5. Do Exercise 4-7-6.
6. Do Exercise 4-7-7.

---

*Hard copy to be submitted **in class** on the due date. No late homework accepted.