

# Optimization Method 2016

## HW 7

Due November 3

1. Solve

$$\min_{x \in \mathbb{R}^2} (x_1^2 + x_2^2 + 2ax_1x_2) \text{ subject to: } |x_1| + |x_2| \leq 1 \quad (1)$$

where  $a$  is a parameter,  $-\infty < a < \infty$

2. Find

$$\min_{x \in \mathbb{R}^n} (x^T A x) \text{ subject to: } x^T x = 1 \quad (2)$$

where  $A$  is a symmetric positively defined  $n \times n$  matrix.

3. a. Solve

$$\min_{x \in \mathbb{R}^3} \sum_{i=1}^3 (x_i^2 + x_i) \quad (3)$$

subject to

$$x_1 - x_2 + 2x_3 = 1, \quad (4)$$

$$2x_1 + x_2 - 3x_3 \leq a, \quad (5)$$

where  $a$  is a parameter,  $-\infty < a < \infty$

- b. Formulate and solve a dual problem.