MATH 435 / 535 HW#2

Due Thursday, Feb 7

BT refers to the textbook by Bertsimas & Tsitsiklis.

1. BT 1.4

2. BT 1.5 a b

   [Comment: In 1.5b, proving the following two statements are enough to finish the proof. You need to submit only the proof of one of these two statements. Below 0 refers to the given optimization problem, I refers to the first reformulation, II refers to the second reformulation.
   (i) Given a feasible solution of 0, find a feasible soln. of I with cost atmost the cost in 0. Given a feasible solution of I, find a feasible soln. of 0 with cost no larger than that of I.
   (ii) [Same two statements as (i) with I replaced by II].

3. BT 2.6

4. BT 2.4 and construct a non-empty polyhedron with no extreme points.

   [Hint: Think about how the feasible set changes (geometrically) when an LP is converted into standard form.]

Note: For problems 3 and 4 assume that we have already proved: Every nonempty polyhedron in the standard form, $P = \{x \in \mathbb{R}^n \mid Ax = b, x \geq 0\}$, has atleast one extreme point.