Exercise 1:
Show that the dual linear program of a primal linear program in canonical form is a linear program in canonical form as well.

Exercise 2:
A system of linear inequalities \( Ax \leq b \) is called inconsistent if there is a \( y \) with \( y^T A = 0 \), \( y^T b < 0 \) and \( y \geq 0 \). Show that the system \( Ax \leq b \) has no solution iff the system is inconsistent.

Exercise 3:
Consider the criterion in Theorem 3.5 of the lecture. Is this criterion necessary? Prove its necessity or give a counterexample.

Exercise 4:
Let be given a primal-dual pair of linear programs. Prove the following assertion: If the primal linear program has a degenerate optimal solution then the dual linear program has more than one optimal solutions.