

EE 458, Spring 2008, HW#5, Due 3/14

- I. For each of the LPs below,
- Formulate the dual problem
 - Use CPLEX to solve the primal and identify
 - the optimal value
 - the values of the decision variables
 - the values of the slack variables
 - the values of the dual variables
 - Use CPLEX to solve the dual and identify
 - the optimal value
 - the values of the decision variables
 - the values of the slack variables
 - the values of the dual variables

1.
 $\max F = 10x_1 + 5x_2 + 3x_3$
s.t.
 $3x_1 + x_2 + x_3 \leq 4$
 $x_1 + x_2 \leq 1$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

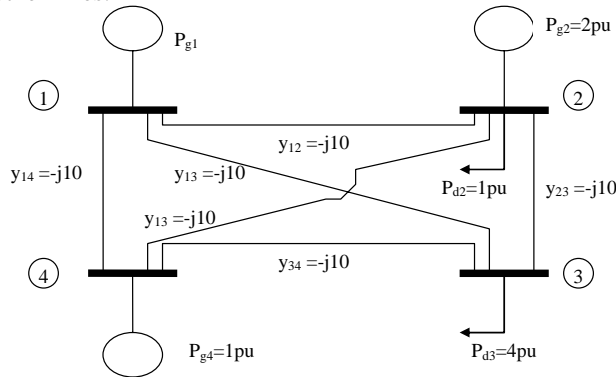
2.
 $\max F = 3x_1 + 2x_2$
s.t.
 $x_1 \leq 12$
 $x_1 + 3x_2 \leq 45$
 $2x_1 + x_2 \leq 30$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

3.
 $\max F = 2x_1 - 2x_2 + 4x_3$
s.t.
 $-x_1 + x_2 + x_3 \leq 20$
 $2x_1 - x_2 + x_3 \leq 10$
 $x_1 + x_2 + 3x_3 \leq 60,$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

4.
 $\max F = 6x_1 + 5x_2 - x_3 + 4x_4$
s.t.
 $3x_1 + 2x_2 - 3x_3 + x_4 \leq 120$
 $3x_1 + 3x_2 + x_3 + 3x_4 \leq 180$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0, x_4 \geq 0$

5.
 $\max F = 15x_1 + 3x_2 + 9x_3 + 12x_4$
s.t.
 $x_1 - 2x_2 + 4x_3 + 3x_4 \leq 10$
 $-4x_1 + 6x_2 + 5x_3 - 4x_4 \leq 20$
 $2x_1 - 3x_2 + 3x_3 + 8x_4 \leq 25$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0, x_4 \geq 0$

- II. Set up and solve the DC load flow for the system below. Compute all line flows. Compare the line flows to those for the solution given in the class notes, and comment on the effect of the added line in terms of loading in other lines.



- III. Now repeat problem II, using the same system, except change the bus 2 generation from 2 to 4. Give all line flows.