ECEN 615 Problem Set #7 Fall 2022

Complete Before Exam 2 But Does Not Need to be Turned In

1. Solve the Lumber Mill problem from class but assume the saw is available for 9 hours per day and the the plane for 12 hours per day.

2. Assume that for a lossless three generator power system the cost functions for each of the generators are (with the indicated restrictions on the output of the generators)

$$\begin{aligned} C_1(P_{G1}) &= 200 + 20\,P_{G1} & 0 \le P_{G1} \le 200 \\ C_2(P_{G2}) &= 150 + 25\,P_{G2} & 0 \le P_{G2} \le 100 \\ C_3(P_{G3}) &= 100 + 30\,P_{G3} & 0 \le P_{G3} \end{aligned}$$

The total load for the system is 300 MW. Additionally, because of transmission system restrictions we require that $P_{G2} - P_{G1} \le 150$

We would like to solve for the least cost dispatch using the LP OPF method.

a. Write the initial LP tableau in canonical form (introducing additional variables as needed). Be sure to label the variable associated with each column.

b. Using the simplex method, calculate the tableau after the first pivot. Circle the pivot element. Show the values of the variables (both basic and nonbasic) after the first pivot.

c. List the basic and nonbasic variables (with their values) after the first pivot. Give the value of the cost function. Is this solution optimal?

3. Minimize $2x_1^2 + x_2^2$ such that $3x_1 + x_2 - 2 \ge 0$