

IE 203 - Operations Research II
Quiz II

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Duration: 40 minutes
This is a CLOSED BOOK exam.

Question I (60 pts.)

Consider the following integer programming problem

$$\begin{array}{llll} \max & z = & 40x_1 + 50x_2 & \\ \text{s.t.} & & 2x_1 + 3x_2 & \leq 12 \\ & & 3x_1 + x_2 & \leq 9 \\ & & x_1, x_2 & \geq 0 \\ & & x_1, x_2 & \text{integer} \end{array}$$

- a. Show graphically the feasible solution set.
- b. Show graphically the convex hull of the feasible solution set and give its algebraic description (using equalities and inequalities).
- c. Solve the LP relaxation of the problem using simplex algorithm and obtain optimal tableau.
- d. Generate the Gomory cut corresponding to the basic variable whose optimal value has the largest fractional part in the optimal tableau obtained in part (c).
- e. Add the new cut to the obtained optimal tableau and reoptimize it using dual simplex algorithm for finding the next LP solution.
- f. Show graphically the generated Gomory cut on the feasible solution graphic drawn in part (a).

Question II (40 pts.)

Find the stationary points of the following problem using **KKT first order necessary conditions**.

$$\begin{array}{ll} \max & xy(x - y) \\ \text{s. t.} & x + y = 8 \\ & x \geq 0, y \geq 0 \end{array}$$