Indian Institute of Technology Jodhpur
MAL 7023 Optimization
Practice Problems

(1) Find the basic feasible solutions for the feasible region represented by the set of equations :

(a) $x_1 + 2x_2 + x_3 = 4$
$2x_1 + x_2 + 5x_3 = 5$

(b) $2x_1 + x_2 - x_3 = 2$
$3x_1 + 2x_2 + x_3 = 3$

(c) $x_1 + 2x_2 + x_3 + x_4 = 2$
$2x_1 + 4x_2 + x_3 - x_4 = 4$

(2) Using simplex method, find the solution to the following LPP :

(a) $\max x_1 + x_2$ *s.t.*
$x_1 + x_2 \leq 2$
$x_1 - x_2 \leq 1$
$x_2 \leq 1$
$x_1, x_2 \geq 0$

(b) $\max 2x_1 + x_2$ *s.t.*
$x_1 + x_2 \geq 2$
$x_1 + x_2 \leq 4$
$x_1, x_2 \geq 0$

(c) $\min -x_1 + 2x_2$ *s.t.*
$x_1 + 2x_2 \geq 1$
$-x_1 + x_2 \leq 1$
$x_1, x_2 \geq 0$

(d) $\max 2x_1 + x_2$ *s.t.*
$3x_1 + 2x_2 \leq 12$
$5x_1 \leq 10$
$x_1 + x_2 \geq 8$
$-x_1 + x_2 \geq 4$
$x_1, x_2 \geq 0$

(3) Using simplex method, find the solution to the following LPP :
$\max 4x_1 + 10x_2$ $s.t.$
$2x_1 + x_2 \leq 50$
$2x_1 + 5x_2 \leq 100$
$2x_1 + 3x_2 \leq 90$
$x_1, x_2 \geq 0$
Does the LPP have more than one optimal solution? Justify.

(4) Starting with the simplex table corresponding to solution $(\frac{6}{5}, \frac{12}{5})$, use simplex method to find the optimal solution to the following LPP:
$\min 7x_1 + 5x_2 s.t.$
$x_1 + 2x_2 \leq 6$
$4x_1 + 3x_2 \leq 12$
$x_1, x_2 \geq 0$