Indian Institute of Technology Jodhpur
MAL 7023 Optimization
Assignment 1

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

$x_1 + 2x_2 + x_3 + x_4 = 2$
$x_1 + 2x_2 + \frac{1}{2}x_3 + x_4 = 2$
Is $(0, 1, 0, 0)$ a BFS? Can the same conclusion be drawn about $(1, \frac{1}{2}, 0, 0)$? Justify your answer.

(2) Find the solution to the following LPP:

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

(3) 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.*
$x_1 + 2x_2 \leq 6$
$4x_1 + 3x_2 \leq 12$
$x_1, x_2 \geq 0$

(4) Find the solution to the following LPP:

$\max 5x_1 + 12x_2 + 4x_3$ *s.t.*
$x_1 + 2x_2 + x_3 \leq 5$
$2x_1 - x_2 + 3x_3 = 2$
$x_1, x_2, x_3 \geq 0$
Using the optimal table of the above, find the optimal solution for the dual of the given problem.

(5) Using two phase method, find the solution to the following LPP :

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

(6) Find the solution to the following LPP:

$\max 5x_1 + 2x_2 \ s.t.$
$x_1 + 2x_2 \leq 4$
$2x_1 + x_2 \leq 6$
$x_1, x_2 \geq 0$

From the optimal table of the above problem, find the optimal solution to the problem when $2x_1 + x_2 \leq 4$ is also included in the set of constraints.