HW # 2

1. Find all basic feasible solutions and hence optimal solution of the following problems $(0,4,0,2)$

   (i) Maximize $Z = x_1 + 2x_2 - x_3 + x_4$

   Subject to $3x_1 + x_2 + x_4 = 6$; $-2x_1 + x_3 + 2x_4 = 4$, $x_1, x_2, x_3, x_4 \geq 0$

   (ii) Minimize $Z = x_1 - 2x_2 + 3x_3 + 4x_4$

   Subject to $x_1 - x_2 + 2x_3 + 2x_4 = 4$, $3x_1 + 4x_3 + 6x_4 = 1$, $x_1, x_2, x_3, x_4 \geq 0$.

2. Use the simplex method to solve

   (i) Min $Z = -x_1 - x_2$

   s/t $x_1 + 2x_2 \leq 3$; $x_1 + x_2 \leq 2$, $3x_1 + 2x_2 \leq 6$, $x_1, x_2 \geq 0$

   Find an alternate optimal solution if one exists $((1,1),(2,0))$

   (ii) Max $Z = 4x_1 + 3x_2 + 2x_3 + x_4$

   s/t $x_1 + 2x_2 + 2x_3 + 3x_4 \leq 12$

   $2x_1 + x_2 + 3x_3 + 2x_4 \leq 12$

   $x_1, x_2, x_3, x_4 \geq 0$. $(x_1 = 4 = x_2)$

   (iii) Max $Z = 3x_1 + x_2 + 2x_3$

   s/t $12x_1 + 3x_2 + 6x_3 + 3x_4 = 9$

   $8x_1 + x_2 - 4x_3 + 2x_5 = 10$

   $3x_1 - x_6 = 0$

   $x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$. $\left(0,0,\frac{3}{2},0,8,0\right)$

   $\underline{Q.2}$ (Page 76) $\underline{Q.10}$ (Page 74), $\underline{Q.18}$ (P 73)
   Ch.3   Ch.3   Ch 3

   $\underline{Q.22}$ (Page 74) $\underline{Q.24}$ (74), $\underline{Q.26}$ (Page 75)
   Ch 3   Ch 3   Ch 3

   $\underline{Q.27}$ (Page 75) $\underline{Q.32}$ (Page 77)
   Ch 3   Ch 3

3. Solve the following problems by two phase method and big M method

   (i) Max $Z = 3x_1 + 2x_2$

   s/t $2x_1 + x_2 \leq 2$

   $3x_1 + 4x_2 \geq 12$

   $x_1, x_2 \geq 0$

   (Infeasible)

   (ii) Min $Z = 4x_1 - 3x_2$

   s/t

   $x_1 - x_2 \geq 0$

   $2x_1 - x_2 \geq 2$

   $x_1, x_2 \geq 0$

   $(2,2)$

   (iii) Max $Z = 5x_1 - 3x_2 + 4x_3$

   s/t

   $x_1 - x_2 \leq 1$

   $-3x_1 + 2x_2 + 2x_3 \leq 1$

   $4x_1 - x_3 = 1$

   $x_2, x_3 \geq 0$, x_1 unrestricted

   $(3/5, 0, 7/5)$