MTL 103: Practice Sheet 6

1. The following table give the cost of transporting material from supply points A, B, C, D to demand points

	$D1$	$D2$	$D3$	$D4$	$D5$	a_i
A	8	10	12	17	15	100
B	15	13	18	11	9	150
C	14	20	6	10	13	180
D	13	19	7	5	12	190
b_j	90	170	50	120	190	

   The present allocation is as follows: $x_{11} = 90,\ x_{12} = 10,\ x_{22} = 150,\ x_{32} = 10,\ x_{33} = 50,\ x_{35} = 120,\ x_{44} = 120,\ x_{45} = 70.$ Check if this allocation is optimal. If not, find optimal schedule.

2. Solve the following unbalanced CMTP:

	D_1	D_2	D_3	D_4	D_5	a_i
S_1	4	5	3	2	5	≥ 12
S_2	2	7	8	1	10	≥ 13
S_3	5	3	2	3	8	≥ 10
S_4	4	6	5	4	6	≥ 15
b_j	10	15	12	13	14	

   What will be the optimal solution if all b_j are less than equal to type and all a_j are equal to type?

3. In an unbalanced problem, sometimes there are penalties for unsatisfied demand. Let the penalty costs per unit of unsatisfied demand be 6, 4, 2 respectively; find optimal solution of the following TP

1	5	6	90
3	2	3	10
2	6	1	20
60	50	50	

4. Solve the following CMAP:

$$\begin{bmatrix} 20 & 23 & 18 & 10 & 16 & 20 \\ 50 & 20 & 17 & 16 & 15 & 11 \\ 60 & 30 & 40 & 55 & 8 & 7 \\ 6 & 7 & 10 & 20 & 100 & 9 \\ 18 & 19 & 28 & 17 & 60 & 70 \\ 9 & 10 & 20 & 30 & 40 & 55 \end{bmatrix}$$

   What happens if M_2 is prohibited from doing J_6? What if M_4 is supposed to do J_4?

5. A horse owner plan to enter 4 horses in 4 races. Any horse can not enter in more than one race. determine optimal pairings so that the total expected profit is maximized.

	race1	race2	race3	race4
1	.20	.40	.10	.50
2	.10	.20	.15	.40
3	.30	.20	.10	.30
4	.20	.50	.20	.40
Profit	1000	2000	5000	2000

6. Find optimal assignment in CMAP where all 5 jobs are to be completed by 4 persons with P_1 and P_2 together have to do atleast one job, P_3 has to do atleast two jobs.

	J_1	J_2	J_3	J_4	J_5
P_1	7	4	8	9	12
P_2	5	6	7	10	13
P_3	8	5	5	6	9
P_4	6	4	9	8	10

7. Consider the following unbalanced CMAP involving 3 persons and 7 jobs

$$\begin{bmatrix} 14 & -4 & -10 & 16 & -8 & 10 & -7 \\ 11 & -8 & 9 & 12 & -11 & 7 & 9 \\ 9 & -10 & -11 & -10 & 9 & 8 & 12 \end{bmatrix}$$

   i. If max no. of jobs to be done by P_1, P_2, P_3 are respectively 2, 1, 2 what would be the optimal solution ?

   ii. If the min no. of jobs to be done by P_1, P_2, P_3 are respectively 1, 2, 2 , find the optimal allocation?

   iii. if one person is to do one job only, which 4 jobs will be left undone?