

Assignment

- Transport problem type where both the no. of person and work is same.
- work assigned in a way that time/cost is minimized.
- assign ~~best~~ vehicles to routes
- assign best person to do work

RC

Q

	J_1	J_2	J_3
P_1	10	20	30
P_2	20	10	40
P_3	50	30	20

⇒

	J_1	J_2	J_3
P_1	0	10	20
P_2	10	0	30
P_3	30	20	0

check rows for minimum no. and subtract it from all no. of that row

now do same for column

	J_1	J_2	J_3
P_1	10	10	20
P_2	10	0	30
P_3	30	20	0

In a row and column there will be only 1 allocation.

So, $P_1 \Rightarrow J_1$, $P_2 \Rightarrow J_2$, $P_3 \Rightarrow J_3$

Assignment	Cost
$P_1 - J_1$	10
$P_2 - J_2$	10
$P_3 - J_3$	20

Total Assignment cost is 40

40

Q

	J_1	J_2	J_3	J_4
1	0	14	9	3
2	9	20	0	22
3	23	0	3	0
4	9	12	17	0

↔ In this row there are 2 zeros so wait and move to next

As 0 is assigned in next row and

0 in previous row in same column can't be allotted so other 0 allow

Q

	S_1	S_2	S_3	S_4
P_1	2	10	9	7
P_2	15	4	14	8
P_3	13	14	16	11
P_4	3	15	13	8

RC

	S_1	S_2	S_3	S_4
P_1	0	10 8	7	5
P_2	11	0	10	4
P_3	2	3	5	0
P_4	0	12	10	5

RC

0	8	2	5
11	0	5	4
2	3	0	0
10 12	5	5	

As no one can be assigned in P_4 then we have to make changes

connect all the zeros either in parallel or horizontal

0 8 ② 5
 Junction ① - 0 - 5 - 4
 Junction ② - 3 - 0 - 0
 0 12 5 5

Now those who are
 not connected from
 those select lowest
 and subtract it from
 not selected and
 so that at junction

⇒ ~~5~~ 5 ① 3
 11 ① 5 4
 ⇒ 4 3 ~~3~~ ①
 ① 10 3 3

now allot

Unbalanced

M ₁	M ₂	M ₃	M ₄
10	7	6	5
12	9	4	9
5	8	3	8

As rows and column are not equal we will intro dummy

10	7	6	5	0
12	9	4	9	0
5	8	3	8	0
0	0	0	0	0

Now solve like others

Maximization Problem

Assign tasks to maximize profit

	P_1	P_2	P_3	P_4	P_5
J_1	5	11	10	12	4
J_2	2	4	6	13	5
J_3	3	12	5	14	6
J_4	6	14	4	11	7
J_5	7	9	8	12	5

Convert it to minimize by subtracting ^{highest} ~~every~~ number from ~~every~~ number

-9	-3	-4	-2	-10
-12	-10	-8	-1	-9
-11	-2	-9	0	-8
-8	0	-10	-3	-7
-7	-5	-6	-2	-9

9	3	4	2	10
12	10	8	1	9
11	2	9	0	8
8	0	10	3	7
7	5	6	2	9

Now solve it normally but while writing final answer insert it Assigned tasks pair price from original table to be taken

Assignment	Price
$J_1 - P_3$	10
$J_2 - P_5$	5
$J_3 - P_4$	14
$J_4 - P_2$	14
$J_5 - P_1$	7

Multiple Solution

After Optimizing

0	2	4	7
0	0	1	
0	0	0	1
2	1	0	0

⇒ In this case both rows and column do not have single zero so multiple solution
Assign as per choice

After 1st assignment gave result
So now, evaluate the personal choice

0	2	4	7	0	0	0	0	0
0	0	0	1	1	1	1	1	1
0	0	0	1	1	1	1	1	1
2	1	0	0	1	1	1	1	1
1	1	1	1	0	1	1	1	1
0	0	0	0	1	1	1	1	1
1	1	1	1	1	0	1	1	1
0	0	0	0	1	1	0	1	1
1	1	1	1	1	1	1	0	1
0	0	0	0	1	1	1	1	0

Restricted Assignment

	A	B	C	D	E
C ₁	4	6	10	5	6
C ₂	7	4	-	5	4
C ₃	-	6	9	6	2
C ₄	9	3	7	2	3

where restriction is placed make cost infinite there so we never choose it

4	6	10	5	6
7	4	∞	5	4
∞	6	9	6	2
9	3	7	2	3
0	0	0	0	0

↓

0	2	6	1	2
3	0	∞	1	0
∞	4	7	4	0
7	1	5	0	1
0	0	0	0	0

$\Rightarrow$

0	2	1	1	2
3	0	∞	1	∞
∞	4	2	4	0
7	1	0	0	1

$\Rightarrow$

0	2	∞	1	2
3	0	∞	1	∞
∞	4	7	4	0
7	1	5	0	1
∞	∞	0	∞	∞

optimize