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OR case STUDY

a) Transportation Problem.
(North West corner method)
An introduction to transpportation problem has been discussed section. In this finding the initial basic feasible solution using the North West corner cell method will be disussed

		Destination				supply
		D1	D2	D3	D4	
source	O1	3	1	7	4	300
	O2	2	6	5	9	400
	O3	8	3	3	2	500
demand		250	350	400	200	1200

→ Given three sources O1, O2, O3 and four destinations D1, D2, D3, and D4. for the sources O1, O2 and O3, the supply is 300, 400, 500 respectively. The destinations D1, D2, D3 & D4 have demands 250, 350, 400 & 200 respectively

solution
Acccoiding to the North West corner method (O1, D1) has to be the starting Point, i.e the north west corner of the table. Each and Every value in the cell is considered as the cost per transportation. compare the demand for column D1 and supply from the source O1 and allocate the minimum of two to the cell (O1, D1) as shown in figure

The demand for column D1 is completed so the entire column D1 will be canceled. The supply from the source O1 remains 300-250 = 50.

	Destination				
		D1	D2	D3	D4	supply
source	O1	250 3	1	7	4	~~300~~ 50
	O2	2	6	5	9	400
	O3	8	3	3	2	500
Demand		~~250~~ 0	350	400	200	1200

Now from the remaining table.ie excluding column D1. check the North West corner, i.e (O1, D2) and allocate the minimum among the supply for the respective column and rows. The supply from O1 is 50 which is less than the demand for D2 i.e (350). so allocate the cell (O1, D2) since the supply from row O1 is completed cancel the row O1. The demand for column D2 remains 350-50=300

	Destination				
		D1	D2	D3	D4	supply
source	O1	250 3	50 1	7	4	~~300~~ ~~50~~ 0
	O2	2	6	5	9	400
	O3	8	3	3	2	500
Demand		~~250~~ 0	~~350~~ 300	400	200	1200

from the remaining table the nort West corner cell is (O_2, D_2). The minimum among the supply from source O_2 (i.e 400) and demand for column D_2 (i.e 300) is 300, so allocate 300 to the cell (O_2, D_2). The demand for the column D_2 is completed so cancel the column and the remaining supply from source O_2 is $400 - 300 = 100$

Destination

		D_1	D_2	D_3	D_4	supply
source	O_1	250 / 3	50 / 1	7	4	~~300~~ ~~50~~ 0
	O_2	2	6	5	9	~~400~~ 100
	O_3	8	3	3	2	500
demand		~~250~~ 0	~~350~~ ~~300~~ 0	400	200	1200

Now from remaining table find the north West corner i.e (O_2, D_3) and compare the O_2 supply (i.e 100) and the demand (i.e 400) and allocate the smaller (i.e 100) to the cell (O_2, D_2). The supply from O_2 is completed so cancel the row O_2. The remaining demand for column D_3 remains $400 - 100 = 300$

Destination

		D_1	D_2	D_3	D_4	supply
source	O_1	~~250~~ 3	~~50~~ 1	7	4	~~300~~ ~~50~~ 0
	O_2	2	~~300~~ 6	~~100~~ 5	9	~~400~~ ~~100~~ 0
demand	O_3	8	3	3	2	500
		~~250~~ 0	~~350~~ ~~300~~ 0	~~400~~ ~~300~~ 0	~~200~~ 0	1200

proceeding in the same way the final values of the cells will be.

		Destination D1	D2	D3	D4	Supply
Source	O1	250 3	50 1	7	4	~~300~~ ~~50~~ 0
	O2	2	~~300~~ 6	~~100~~ 5	9	~~400~~ ~~100~~ 0
	O3	8	3	3	2	500 ~~200~~ 0
Demand		~~250~~ 0	~~350~~ ~~300~~ 0	~~400~~ ~~300~~ 0	~~200~~ 0	1200

Note: In the remaining cell the demand for the respective columns and rows are equal which was cell (O3, D4). In this case, the supply from O3 and the demand for D4 was 200 which was allocated to this cell. At last, nothing remained for any row or column.

Now, just multiply the allocated value with the respective cell value (i.e. the cost) and add all of them to get the basic solution. i.e.

(250 * 3) + (50 * 1) + (300 * 6) + (100 * 5) + (300 * 3) + (200 * 2)

= 750 + 50 + 1800 + 500 + 900 + 400

= 4400