TD - Week 4

November 2025

Questions

Instructions: For every problem below, you are given an initial basic feasible solution (already allocated). Your task is to:

1. Test optimality using either **MODI Method** or **Stepping Stone Method** (as specified)
2. If not optimal, identify the entering cell and create a loop
3. Perform one iteration to improve the solution
4. Compute the new total cost
5. Continue until the solution is optimal

1. (MODI) The following initial solution was obtained. Test for optimality using **MODI Method**. If not optimal, improve it until optimal.

	D_1	D_2	D_3	Supply
S_1	$\boxed{20}$ 8	6	$\boxed{30}$ 4	50
S_2	5	$\boxed{40}$ 3	$\boxed{10}$ 7	50
S_3	$\boxed{30}$ 6	9	5	30
Demand	50	40	40	

(Boxed values are allocations; other numbers are costs)

2. (Stepping Stone) Use **Stepping Stone Method** to test and improve the following solution:

	W_1	W_2	W_3	W_4	Supply
F_1	$\boxed{25}$ 4	$\boxed{15}$ 7	9	6	40
F_2	8	$\boxed{25}$ 5	$\boxed{30}$ 3	10	55
F_3	$\boxed{20}$ 6	11	$\boxed{15}$ 8	4	35
Demand	45	40	45	0	

3. (MODI) Apply **MODI Method** to check optimality and improve if necessary:

	P_1	P_2	P_3	Supply
Q_1	$\boxed{40}$ 3	8	$\boxed{20}$ 5	60
Q_2	7	$\boxed{50}$ 4	$\boxed{30}$ 6	80
Q_3	$\boxed{10}$ 2	9	7	10
Demand	50	50	50	

4. (Stepping Stone) Test the following allocation using **Stepping Stone Method**:

	D_1	D_2	D_3	D_4	Supply
S_1	12	$\boxed{30}$ 8	$\boxed{20}$ 6	10	50
S_2	$\boxed{40}$ 7	9	$\boxed{35}$ 4	11	75
S_3	$\boxed{10}$ 5	13	8	$\boxed{15}$ 3	25
Demand	50	30	55	15	

5. (MODI) Given the initial basic feasible solution below, use **MODI Method** to find the optimal solution:

	M_1	M_2	M_3	Supply
P_1	$\boxed{50}$ 10	15	$\boxed{30}$ 12	80
P_2	13	$\boxed{60}$ 9	$\boxed{20}$ 14	80
P_3	$\boxed{20}$ 11	16	18	20
Demand	70	60	50	

6. (Stepping Stone) The following is an initial solution. Apply **Stepping Stone Method** to

reach optimality:

	A	B	C	Supply
X	$\boxed{30}$ 5	$\boxed{20}$ 8	12	50
Y	9	$\boxed{40}$ 6	$\boxed{10}$ 7	50
Z	$\boxed{10}$ 4	10	$\boxed{30}$ 9	40
Demand	40	60	40	

7. (MODI) Test optimality using **MODI Method** and improve:

	C_1	C_2	C_3	C_4	Supply
W_1	$\boxed{35}$ 6	11	$\boxed{25}$ 8	13	60
W_2	9	$\boxed{45}$ 7	10	$\boxed{15}$ 5	60
W_3	$\boxed{15}$ 4	12	$\boxed{35}$ 6	14	50
Demand	50	45	60	15	

8. (Stepping Stone) Use **Stepping Stone Method** to optimize:

	D_1	D_2	D_3	Supply
S_1	14	$\boxed{60}$ 8	$\boxed{40}$ 10	100
S_2	$\boxed{50}$ 6	12	$\boxed{30}$ 7	80
S_3	$\boxed{30}$ 9	$\boxed{10}$ 11	15	40
Demand	80	70	70	

9. (MODI) Apply **MODI Method** to find the optimal solution:

	P_1	P_2	P_3	P_4	Supply
F_1	$\boxed{20}$ 7	10	$\boxed{30}$ 5	12	50
F_2	9	$\boxed{25}$ 6	$\boxed{35}$ 8	11	60
F_3	$\boxed{10}$ 4	$\boxed{15}$ 9	13	7	25
Demand	30	40	65	0	

10. (Stepping Stone) Test and improve using **Stepping Stone Method**:

	W_1	W_2	W_3	Supply
D_1	$\boxed{40}$ 9	$\boxed{20}$ 6	11	60
D_2	12	$\boxed{50}$ 7	$\boxed{30}$ 8	80
D_3	$\boxed{20}$ 5	13	$\boxed{10}$ 10	30
Demand	60	70	40	

11. (MODI) Given initial solution, use **MODI Method** to optimize:

	M_1	M_2	M_3	M_4	Supply
S_1	8	$\boxed{45}$ 5	$\boxed{35}$ 9	12	80
S_2	$\boxed{30}$ 6	10	$\boxed{40}$ 7	14	70
S_3	$\boxed{20}$ 4	11	13	$\boxed{30}$ 8	50
Demand	50	45	75	30	

12. (Stepping Stone) Apply **Stepping Stone Method**:

	A	B	C	Supply
P	$\boxed{25}$ 11	15	$\boxed{35}$ 7	60
Q	13	$\boxed{40}$ 9	$\boxed{20}$ 10	60
R	$\boxed{30}$ 8	$\boxed{10}$ 12	14	40
Demand	55	50	55	

13. (MODI) Test optimality with **MODI Method**:

	X	Y	Z	Supply
A	$\boxed{60}$ 4	10	$\boxed{20}$ 6	80
B	8	$\boxed{70}$ 5	$\boxed{10}$ 9	80
C	$\boxed{10}$ 3	11	$\boxed{30}$ 7	40
Demand	70	70	60	

14. (Stepping Stone) Use **Stepping Stone Method** to optimize:

	D_1	D_2	D_3	D_4	Supply
S_1	[30] 10	14	[40] 8	12	70
S_2	11	[50] 6	[20] 9	13	70
S_3	[20] 7	15	11	[20] 5	40
Demand	50	50	60	20	

15. (MODI) Apply **MODI Method** to reach optimal solution:

	P_1	P_2	P_3	Supply
W_1	[50] 12	[30] 9	16	80
W_2	14	[40] 7	[30] 11	70
W_3	[20] 10	15	[30] 8	50
Demand	70	70	60	

16. (Stepping Stone) Test the solution using **Stepping Stone Method**:

	C_1	C_2	C_3	C_4	Supply
F_1	13	[40] 7	[20] 9	15	60
F_2	[35] 8	12	[45] 6	14	80
F_3	[25] 5	10	13	[15] 7	40
Demand	60	40	65	15	

17. (MODI) Use **MODI Method** to find optimal allocation:

	M_1	M_2	M_3	Supply
S_1	16	[50] 8	[30] 12	80
S_2	[40] 9	13	[40] 7	80
S_3	[30] 6	[10] 11	15	40
Demand	70	60	70	

18. (Stepping Stone) Apply **Stepping Stone Method**:

	W_1	W_2	W_3	W_4	Supply
P_1	[25] 5	11	[35] 7	13	60
P_2	9	[30] 6	[25] 8	10	55
P_3	[20] 4	[25] 9	12	14	45
Demand	45	55	60	0	

19. (MODI) Test optimality using **MODI Method** and improve:

	D_1	D_2	D_3	Supply
S_1	[45] 7	13	[25] 9	70
S_2	11	[55] 6	[35] 8	90
S_3	[15] 5	14	[25] 10	40
Demand	60	55	85	

20. (Stepping Stone) Use **Stepping Stone Method** to reach optimal solution:

	C_1	C_2	C_3	C_4	Supply
W_1	10	[35] 6	[30] 8	12	65
W_2	[40] 7	11	[30] 5	13	70
W_3	[20] 4	9	14	[25] 6	45
Demand	60	35	60	25	