

Random Assignment Problem (seed = 110204)

Original Cost matrix:

o		1	2	3	4	5	6	7	8	9
1		23	25	21	11	11	12	18	19	12
2		24	17	22	21	25	20	11	15	15
3		25	14	19	11	19	23	25	20	24
4		17	22	10	25	14	15	22	12	21
5		14	17	14	22	20	25	11	23	25
6		14	20	14	21	14	22	25	21	23
7		17	22	12	15	15	16	16	17	17
8		21	24	13	13	12	16	17	24	10
9		18	15	14	22	22	17	24	19	22

Hungarian Algorithm Example

Row Reduction

Dual variables:

i		1	2	3	4	5	6	7	8	9		sum
U[i]		11	11	11	10	11	14	12	10	14		104
V[i]		0	0	0	0	0	0	0	0	0		0

Sum of all dual variables: 104

Reduced cost matrix

o	1	2	3	4	5	6	7	8	9
1	12	14	10	0	0	1	7	8	1
2	13	6	11	10	14	9	0	4	4
3	14	3	8	0	8	12	14	9	13
4	7	12	0	15	4	5	12	2	11
5	3	6	3	11	9	14	0	12	14
6	0	6	0	7	0	8	11	7	9
7	5	10	0	3	3	4	4	5	5
8	11	14	3	3	2	6	7	14	0
9	4	1	0	8	8	3	10	5	8

Column Reduction

Dual variables:

i	1	2	3	4	5	6	7	8	9	sum
U[i]	11	11	11	10	11	14	12	10	14	104
V[i]	0	1	0	0	0	1	0	2	0	4

Sum of all dual variables: 108

Reduced cost matrix

o	1	2	3	4	5	6	7	8	9
1	12	13	10	0	0	0	7	6	1
2	13	5	11	10	14	8	0	2	4
3	14	2	8	0	8	11	14	7	13
4	7	11	0	15	4	4	12	0	11
5	3	5	3	11	9	13	0	10	14
6	0	5	0	7	0	7	11	5	9
7	5	9	0	3	3	3	4	3	5
8	11	13	3	3	2	5	7	12	0
9	4	0	0	8	8	2	10	3	8

Zero reduced costs

o	1	2	3	4	5	6	7	8	9
1	+	+	+	0	0	0	+	+	+
2	+	+	+	+	+	+	0	+	+
3	+	+	+	0	+	+	+	+	+
4	+	+	0	+	+	+	+	0	+
5	+	+	+	+	+	+	0	+	+
6	0	+	0	+	0	+	+	+	+
7	+	+	0	+	+	+	+	+	+
8	+	+	+	+	+	+	+	+	0
9	+	0	0	+	+	+	+	+	+

Reduced cost matrix

o	1	2	3	4	5	6	7	8	9
1	12	15	12	2	0	0	9	8	3
2	11	5	11	10	12	6	0	2	4
3	12	2	8	0	6	9	14	7	13
4	5	11	0	15	2	2	12	0	11
5	1	5	3	11	7	11	0	10	14
6	0	7	2	9	0	7	13	7	11
7	3	9	0	3	1	1	4	3	5
8	9	13	3	3	0	3	7	12	0
9	2	0	0	8	6	0	10	3	8

Zero reduced costs

o	1	2	3	4	5	6	7	8	9
1	+	+	+	+	0	0	+	+	+
2	+	+	+	+	+	+	0	+	+
3	+	+	+	0	+	+	+	+	+
4	+	+	0	+	+	+	+	0	+
5	+	+	+	+	+	+	0	+	+
6	0	+	+	+	0	+	+	+	+
7	+	+	0	+	+	+	+	+	+
8	+	+	+	+	0	+	+	+	0
9	+	0	0	+	+	0	+	+	+

Problem ID:

Random Assignment Problem (seed = 430063)

Original Cost matrix:

o	1	2	3	4	5	6	7	8	9
1	15	18	24	17	17	13	12	19	14
2	23	10	22	17	12	23	17	18	21
3	24	15	14	18	10	14	11	19	21
4	15	24	12	14	12	15	21	19	16
5	17	12	18	20	14	18	17	17	10
6	18	21	22	17	16	10	22	25	14
7	19	19	12	22	22	17	23	20	11
8	14	14	11	24	23	15	21	19	15
9	20	11	22	25	20	14	11	17	19

Row Reduction

Dual variables:

i	1	2	3	4	5	6	7	8	9	sum
U[i]	12	10	10	12	10	10	11	11	11	97
V[i]	0	0	0	0	0	0	0	0	0	0

Sum of all dual variables: 97

Hungarian Algorithm Example

Reduced cost matrix

o	1	2	3	4	5	6	7	8	9
1	3	6	12	5	5	1	0	7	2
2	13	0	12	7	2	13	7	8	11
3	14	5	4	8	0	4	1	9	11
4	3	12	0	2	0	3	9	7	4
5	7	2	8	10	4	8	7	7	0
6	8	11	12	7	6	0	12	15	4
7	8	8	1	11	11	6	12	9	0
8	3	3	0	13	12	4	10	8	4
9	9	0	11	14	9	3	0	6	8

Column Reduction

Dual variables:

i	1	2	3	4	5	6	7	8	9		sum
U[i]	12	10	10	12	10	10	11	11	11		97
V[i]	3	0	0	2	0	0	0	6	0		11

Sum of all dual variables: 108

Reduced cost matrix

o		1	2	3	4	5	6	7	8	9
1		0	6	12	3	5	1	0	1	2
2		10	0	12	5	2	13	7	2	11
3		11	5	4	6	0	4	1	3	11
4		0	12	0	0	0	3	9	1	4
5		4	2	8	8	4	8	7	1	0
6		5	11	12	5	6	0	12	9	4
7		5	8	1	9	11	6	12	3	0
8		0	3	0	11	12	4	10	2	4
9		6	0	11	12	9	3	0	0	8

Zero reduced costs

o	1	2	3	4	5	6	7	8	9
1	0	+	+	+	+	+	0	+	+
2	+	0	+	+	+	+	+	+	+
3	+	+	+	+	0	+	+	+	+
4	0	+	0	0	0	+	+	+	+
5	+	+	+	+	+	+	+	+	0
6	+	+	+	+	+	0	+	+	+
7	+	+	+	+	+	+	+	+	0
8	0	+	0	+	+	+	+	+	+
9	+	0	+	+	+	+	0	0	+

Mixed Row/Column Reduction

Lined rows: 1 2 3 4 6 8 9

Lined columns: 9

Total # lines = 8

Dual variables:

i	1	2	3	4	5	6	7	8	9	sum
U[i]	11.5	9.5	9.5	11.5	10.5	9.5	11.5	10.5	10.5	94.5
V[i]	3.5	0.5	0.5	2.5	0.5	0.5	0.5	6.5	-0.5	14.5

Sum of all dual variables: 109

Check for zeroes in reduced cost matrix to determine all possible matches:

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

Cost = 109