EmReingoldmJNievergeltNarsngDe
Combinatorial algorithms

	1	2	3	4
1	x	2	13	6
2	21	x	45	12
3	11	12	x	34
4	16	17	18	x

solution:1 2 4 3 1 == 2+12+18+11=43

reduce rows:2+12+11+16

	1	2	3	4
1	x	0	11	4
2	9	x	33	0
3	0	1	x	23
4	0	1	2	x

reduce columns:2

	1	2	3	4
1	x	0	9	4
2	9	x	31	0
3	0	1	x	23
4	0	1	0	x

X(4,3)

43

	1	2	3	4
1	x	0	9	4
2	9	x	31	0
3	0	1	x	23
4	0	1	x	x

include(4,3)

	1	2	4
1	x	0	4
2	9	x	0
3	0	1	23

43

reduceR:
reduceC:9

reduceR
reduceC:

X(3,1)

52

	1	2	3	4
1	x	0	0	4
2	9	x	22	0
3	0	1	x	23
4	0	1	x	x

include(3,1)

	1	2	4
1	x	0	4
2	9	x	0
3	x	1	23

	2	4
1	0	4
2	x	0

X(1,2) include(1,2)

	2	4
1	x	4
2	x	0

2 | 4 | 0 |

reduce

X(3,1)

43

	1	2	4
1	x	0	4
2	9	x	0
3	x	1	23

reduceR:4 -->47 stop include(2,4)
solution is along this path.

reduceR:1

	1	2	4
1	x	0	4
2	9	x	0
3	x	0	22

solution path:3 1 2 4
pathlength 43

reducec:9-->52 stc

EmReingoldmJNievergeltNarsngDe
Combinatorial algorithms

	1	2	3	4
1	x	10	15	20
2	5	x	9	10
3	6	13	x	12
4	8	8	9	x

R:10+5+(

	1	2	3	4
1	x	0	5	10
2	0	x	4	5
3	0	7	x	6
4	0	0	1	x

C:1+5

	1	2	3	4
1	x	0	4	5
2	0	x	3	0
3	0	7	x	1
4	0	0	0	x

lb: 35

35

include(1,2)

	1	3	4
2	0	3	0
3	0	x	1
4	0	0	x

x(1,2)

	1	2	3	4	
1	x	x	4	5	>35
2	0	x	3	0	
3	0	7	x	1	
4	0	0	0	x	

35 include((2,4)

	1	3
3	0	x
4	0	0

x(2,4)

	1	3	4
2	0	3	x
3	0	x	1
4	0	0	x

>35

35
include(4,3)

	1
3	0

x(4,3)

	1	3
3	0	x
4	0	x

>35

The shortest cycle is 1 2 4 3

If we has starteted with (4,1), we would have to abandon it.

EmReingoldmJNievergeltNarsngDe
Combinatorial algorithms

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

r: 1+4+7+10 = 22 c:1+2

	1	2	3	4
1	x	0	1	2
2	0	x	1	2
3	0	1	x	2
4	0	1	2	x

	1	2	3	4
1	x	0	0	0
2	0	x	0	0
3	0	1	x	0
4	0	1	1	x

lb: 25

l(1,2) E(1,2)

	1	3	4
2	0	0	0
3	0	x	0
4	0	1	x

	1	2	3	4
1	x	x	0	0
2	0	x	0	0
3	0	1	x	0
4	0	1	1	x

l(2,3)

	1	4
3	0	0
4	0	x

r:1 lb: 26

	1	2	3	4
1	x	x	0	0
2	0	x	0	0
3	0	0	x	0
4	0	0	1	x

l(3,4)

	1
4	0

l(4,1)

Path: 1,2,3,4,1 min length is 25.

EmReingoldmJNievergeltNarsngDe
Combinatorial algorithms

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

r: 1+4+7+10 = 22

c:1+2

	1	2	3	4
1	x	0	1	2
2	0	x	1	2
3	0	1	x	2
4	0	1	2	x

	1	2	3	4
1	x	0	0	0
2	0	x	0	0
3	0	1	x	0
4	0	1	1	x

lb: 25

I(1,3)

E(1,3)

	1	2	4
2	0	x	0
3	0	1	0
4	0	1	x

	1	2	3	4
1	x	0	x	0
2	0	x	0	0
3	0	1	x	0
4	0	1	1	x

this will lead to lb:26

try(1,2) and continue