

CO CW 3

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Problem 1

$$\max \quad 10x_1 + 22x_2 + 35x_3 + 19x_4 + 55x_5 + 10x_6 + 115x_7 - 2000\delta_7$$

$$\text{s.t.} \quad x_1 + 2x_2 + 3.7x_3 + 2.4x_4 + 4.5x_5 + 0.7x_6 + 9.5x_7 \leq 720 - 80\delta_6$$

$$x_6 \leq 1028\delta_6$$

$$x_7 \leq 75\delta_7$$

$$x_6 \geq \delta_6$$

$$x_7 \geq \delta_7$$

$$\delta_6, \delta_7 = \{0, 1\}$$

$$x_1, x_2, x_3, x_4, x_5, x_6, x_7 \geq 0 \text{ and is Integer}$$

Problem 2 : (PFS applied)

Initial LB : (\ast, \ast, \ast, \ast) Now $UB = 28$

The SPT order is (3, 4, 1, 2), $d = \max(16, 25, 26, 27) = 27$

	3	4	1	2
s_j	0	8	17	29
c_j	8	17	29	44
T_j	0	0	2	17

$\Rightarrow LB = 19$

LB for (1, \ast, \ast, \ast), given by the problem which is 19.

LB for (1, 2, \ast, \ast)

The SPT order is (1, 2, 3, 4) $d = \max(26, 27) = 27$

	1	2	3	4
s_j	0	12	27	35
c_j	12	27	35	44
T_j	0	2	8	17

$\Rightarrow LB = 27 < 28$

\uparrow
27-25

LB for (1, 2, 3, 4)

	1	2	3	4
s_j	0	12	27	35
c_j	12	27	35	44
T_j	0	2	9	17

$\Rightarrow \sum T_i = 28 = 28$

LB for (1, 2, 4, 3)

	1	2	4	3
s_j	0	12	27	36
c_j	12	27	36	44
T_j	0	2	9	18

$$\Rightarrow \sum T_i = 29 > 28$$

LB for (1, 3, *, *) UB is now 28.

SPT order is (1, 3, 4, 2), $d = \max(25, 27) = 27$

	1	3	4	2
s_j	0	12	20	29
c_j	12	20	29	44
T_j	0	0	2	17

$$\Rightarrow LB = 19 < 28$$

LB for (1, 3, 2, 4), UB is now 28

	1	3	2	4
s_j	0	12	20	35
c_j	12	20	35	44
T_j	0	0	10	17

$$\Rightarrow \sum T_i = 27 = 27$$

No, UB is updated to 27.

LB for (1, 3, 4, 2)

	1	3	4	2
s_i	0	12	20	29
c_j	12	20	29	44
T_j	0	0	2	19

$\Rightarrow \sum T_i = 21 < 27$
 UB is now updated to 21

LB for (1, 4, *, *)

SPT order is (1, 4, 3, 2) $d = \max(25, 26) = 26$

	1	4	3	2
s_i	0	12	21	29
c_j	12	21	29	44
T_j	0	0	3	18

$\Rightarrow \sum T_j = 21 = 21$
 No need to search its branch.

LB for (2, *, *, *)

SPT order is (2, 3, 4, 1) $d = \max(16, 26, 27) = 27$

	2	3	4	1
s_i	0	15	23	32
c_j	15	23	32	44
T_j	0	0	5	17

LB = 22 > 21
 No need to search its branch.

LB for (3, *, *, *)

SPT order is (3, 4, 1, 2) $d = \max(16, 45, 27) = 27$

	3	4	1	2
s_i	0	8	17	29
c_j	8	17	29	44
T_j	0	0	2	17

$$LB = 19 < 21$$

LB for (3, 1, *, *)

SPT order is (3, 1, 4, 2) $d = \max(25, 17) = 27$

	3	1	4	2
s_i	0	8	20	29
c_j	8	20	29	44
T_j	0	4	2	17

$$LB = 23 > 21$$

No need to search its branch.

LB for (3, 2, *, *)

SPT order is (3, 2, 4, 1) $d = \max(16, 27) = 27$

	3	2	4	1
s_i	0	8	23	32
c_j	8	23	32	44
T_j	0	0	5	17

$$LB = 22 > 21$$

No need to search its branch

LB for (3, 4, *, *)

SPT order is (3, 4, 1, 2) $d = \max(16, 25) = 25$

	3	4	1	2
s_i	0	8	17	29
c_i	8	17	29	44
T_j	0	0	4	19

LB = 23 > 21

No need to search
its branch.

LB for (4, *, *, *)

SPT order is (4, 3, 1, 2) $d = \max(16, 25, 26) = 26$

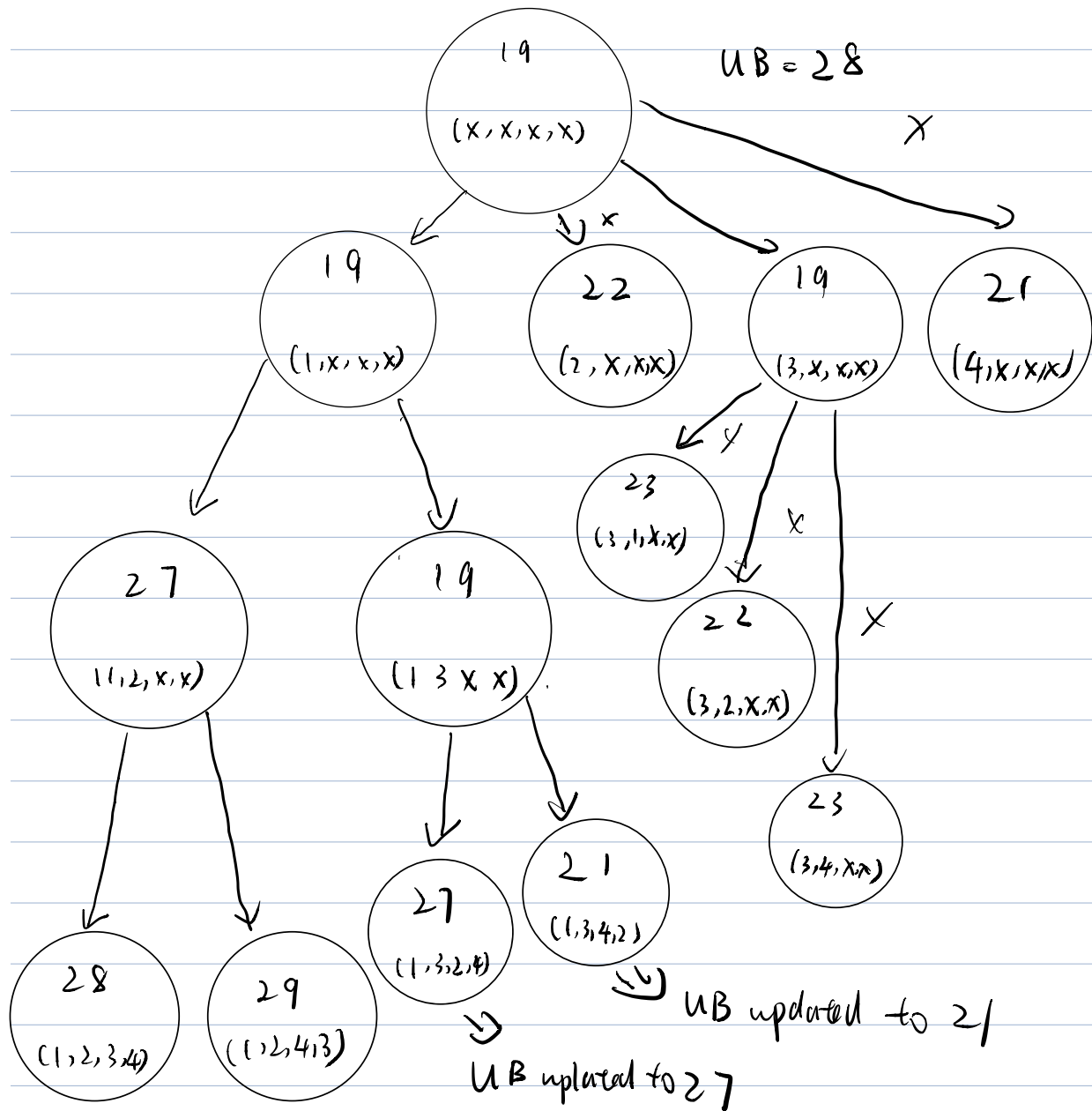
	4	3	1	2
s_i	0	9	17	29
c_i	9	17	29	44
T_j	0	0	3	18

LB = 21 = 21

No need to search
its branch.

So, optimum value is (1, 3, 4, 2)

The search tree is :



The optimal value is (1, 3, 4, 2)