Solution Progress

Petar Veličković Thomas Sauerwald

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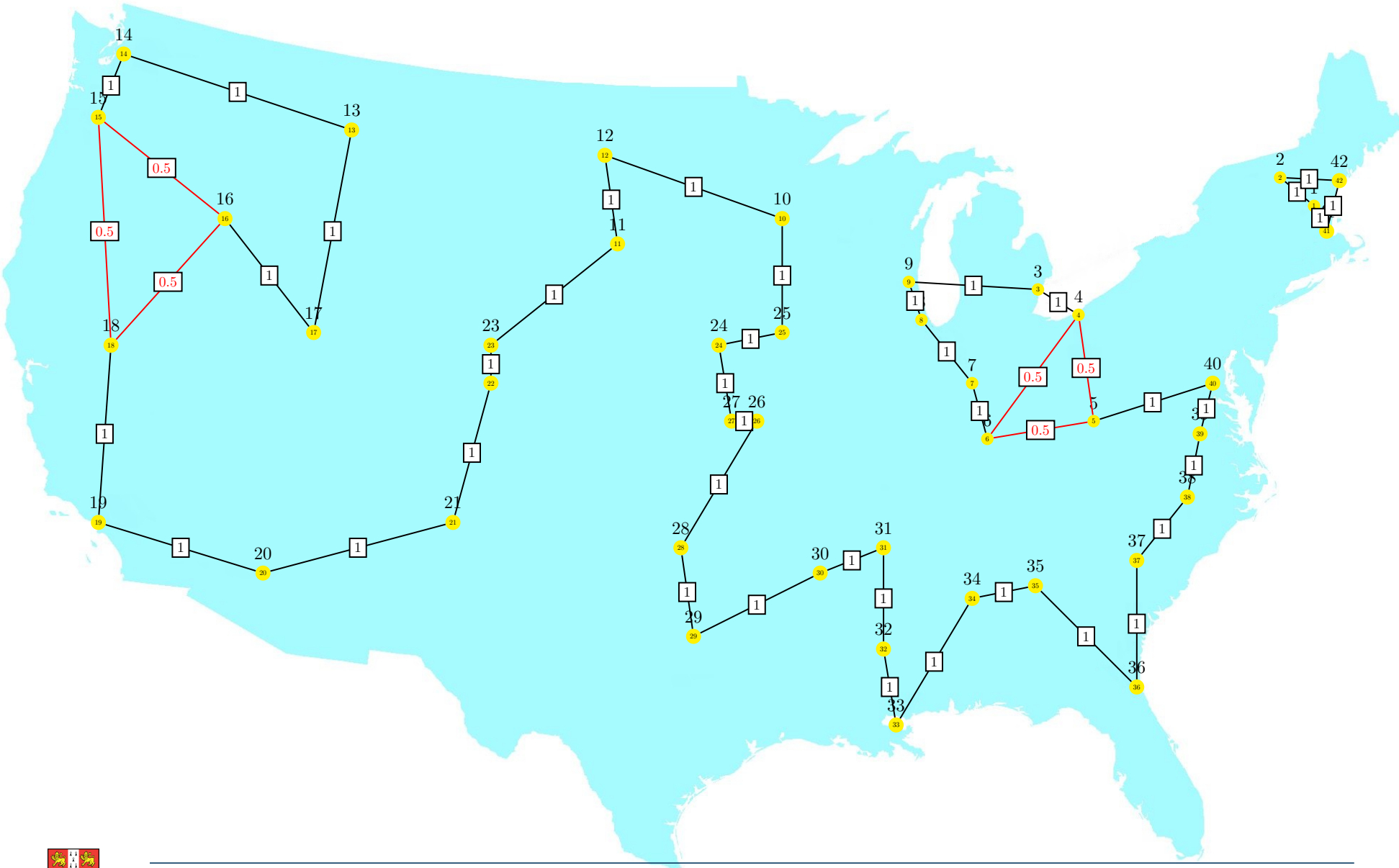
UNIVERSITY OF
CAMBRIDGE

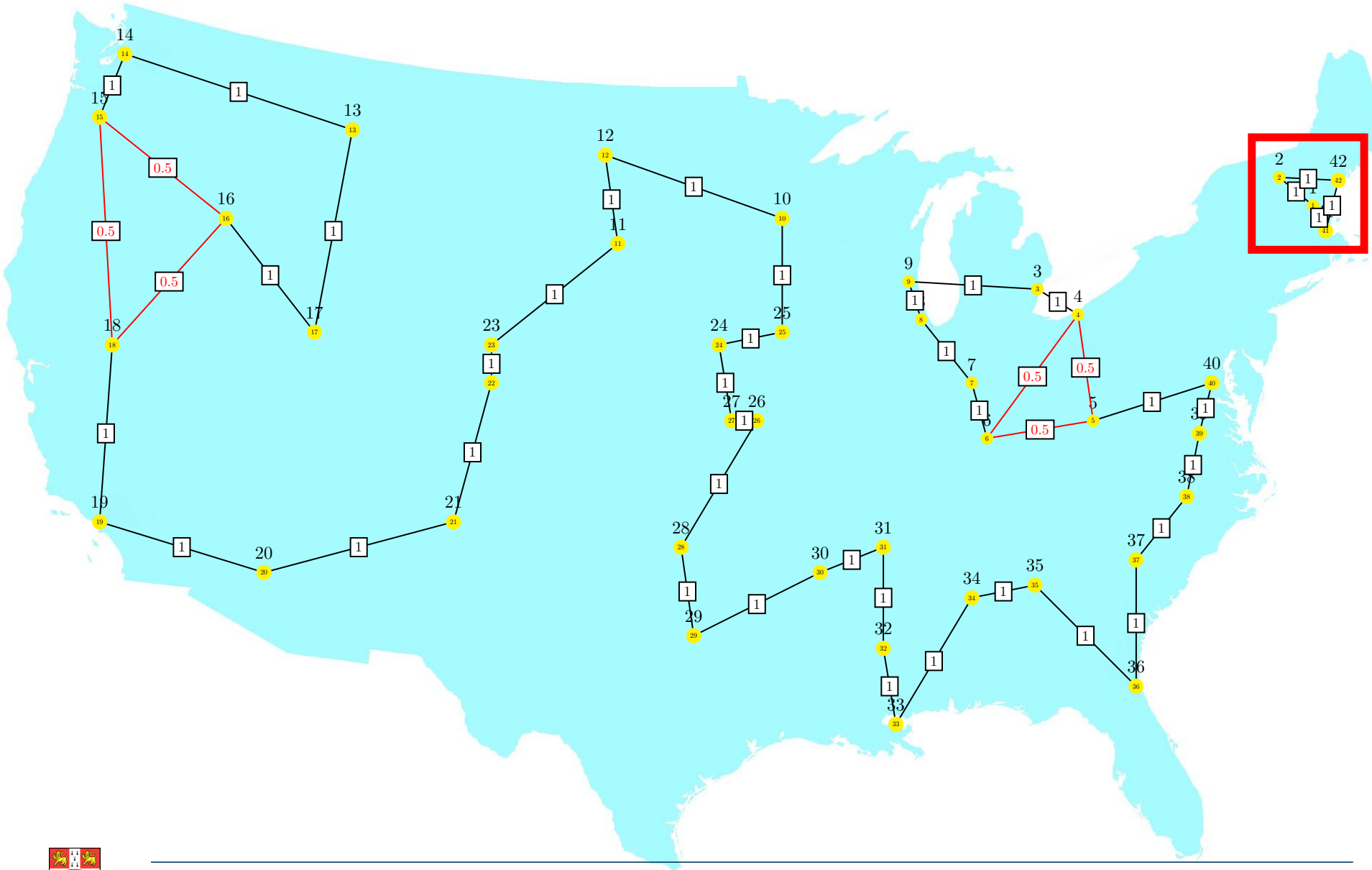
Iteration 1:

Objective value: -641.000000, 861 variables, 945 constraints, 1809 iterations



Iteration 1: Eliminate Subtour $1, 2, 41, 42$

Objective value: -641.000000, 861 variables, 945 constraints, 1809 iterations

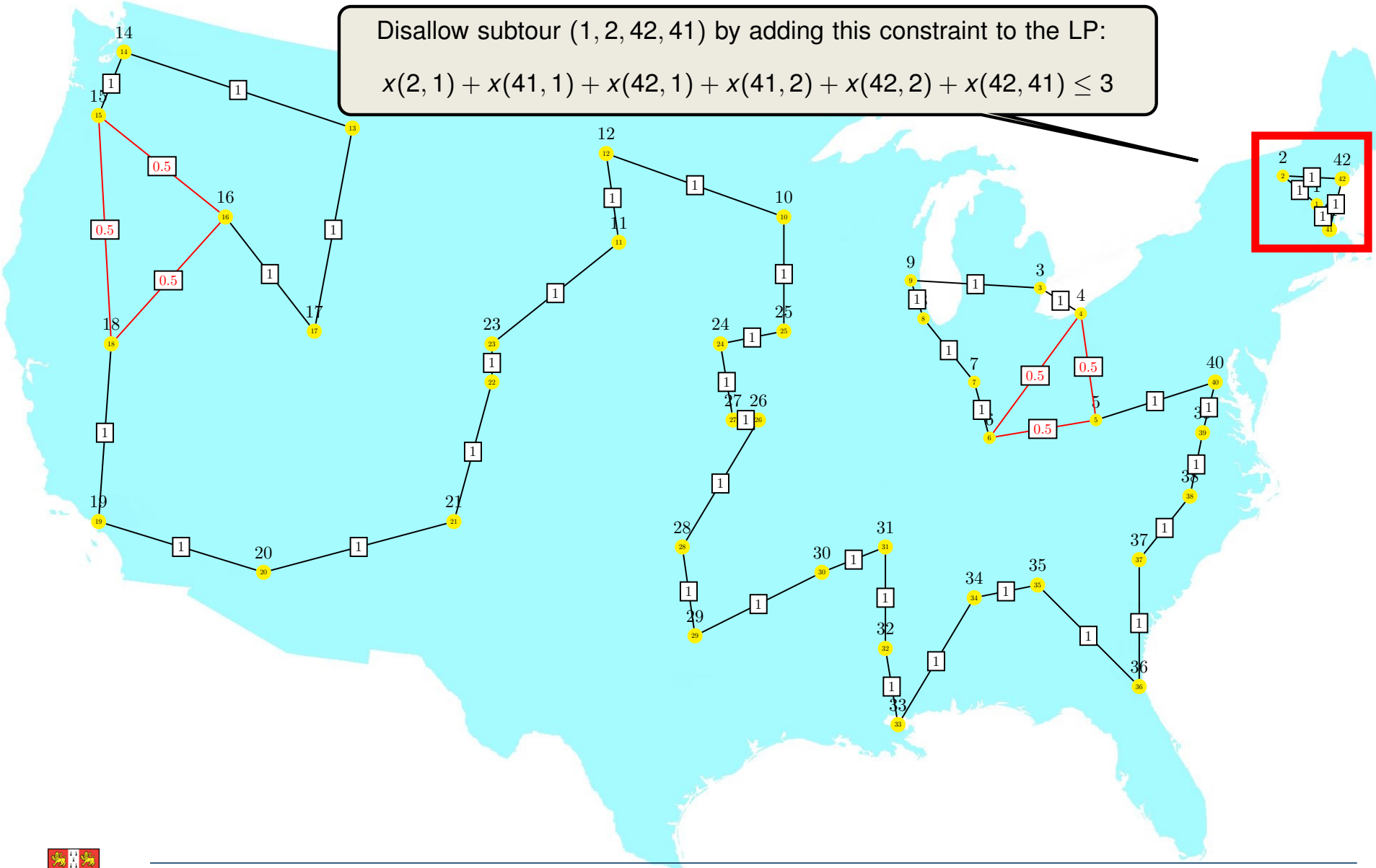


Iteration 1: Eliminate Subtour $1, 2, 41, 42$

Objective value: -641.000000, 861 variables, 945 constraints, 1809 iterations

Disallow subtour $(1, 2, 42, 41)$ by adding this constraint to the LP:

$$x(2,1) + x(41,1) + x(42,1) + x(41,2) + x(42,2) + x(42,41) \leq 3$$



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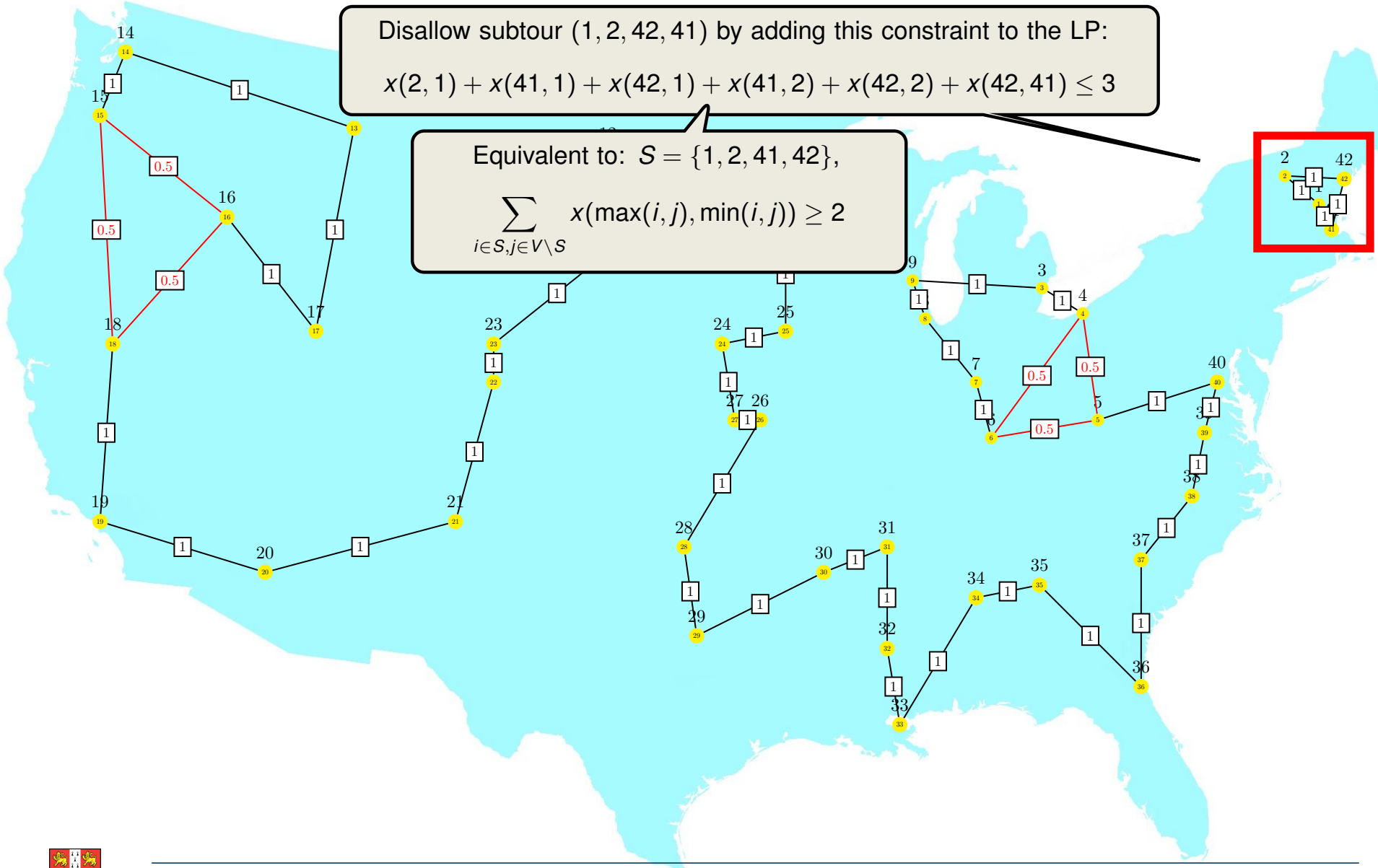
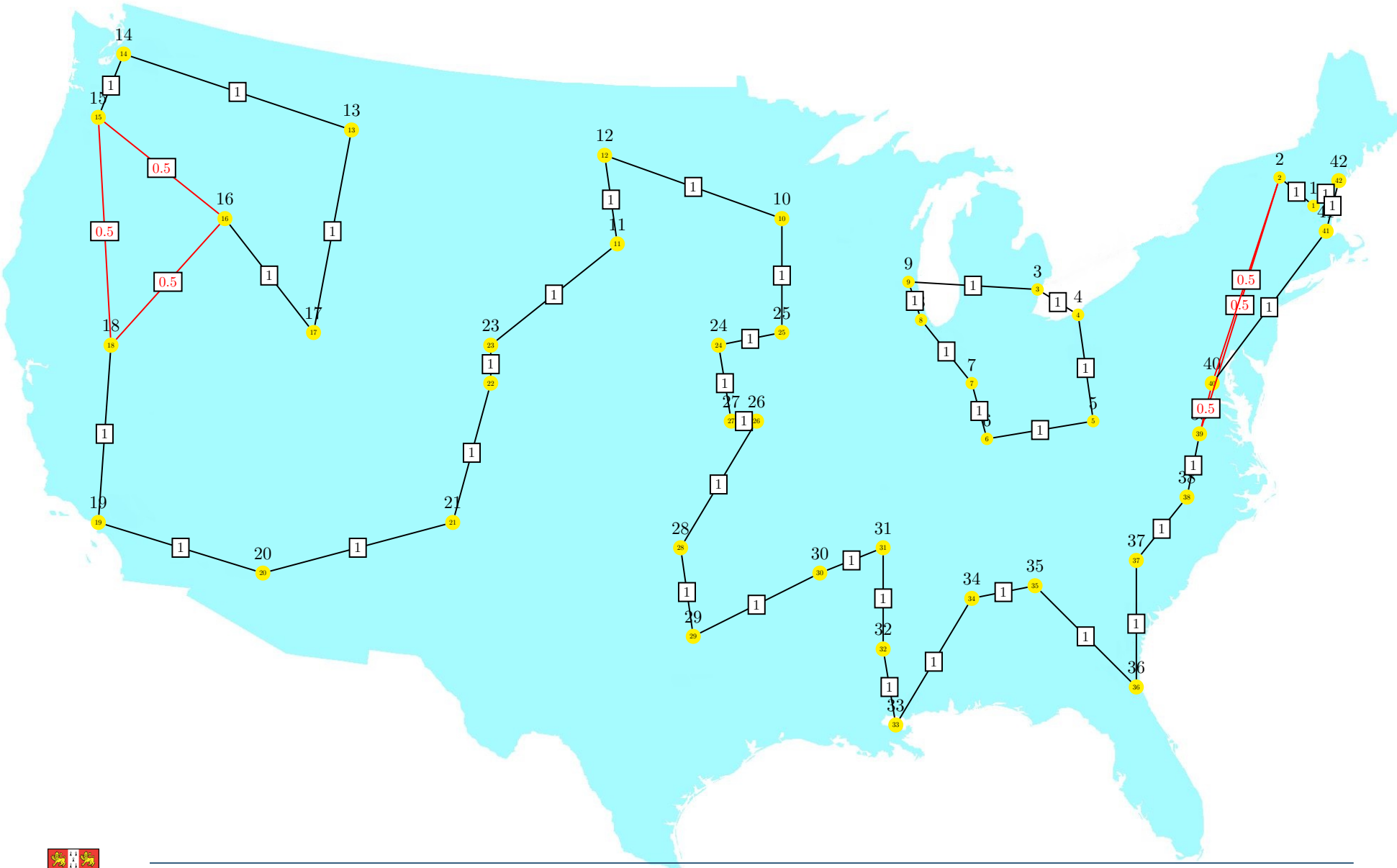


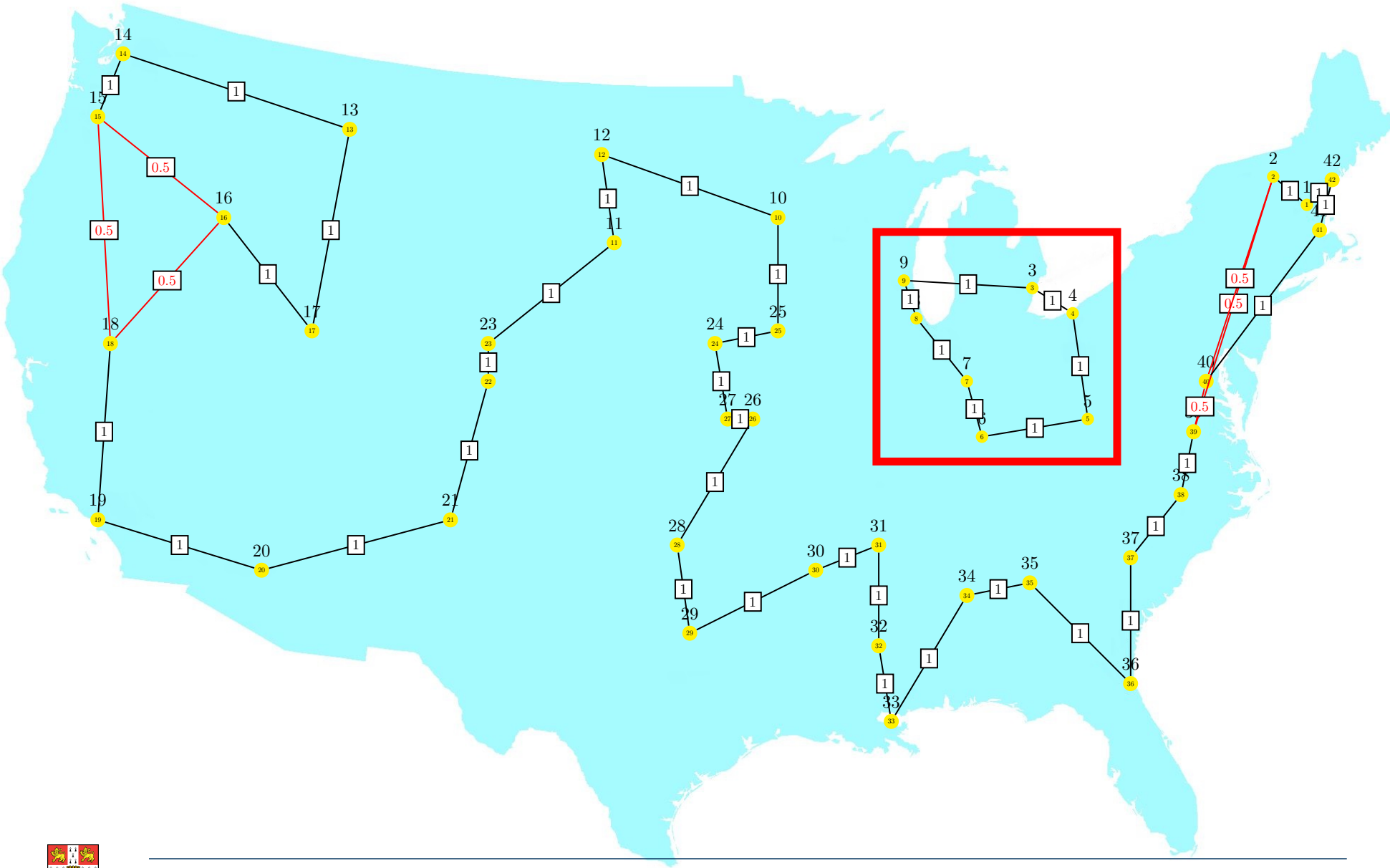
Iteration 2:

Objective value: -676.000000, 861 variables, 946 constraints, 1802 iterations



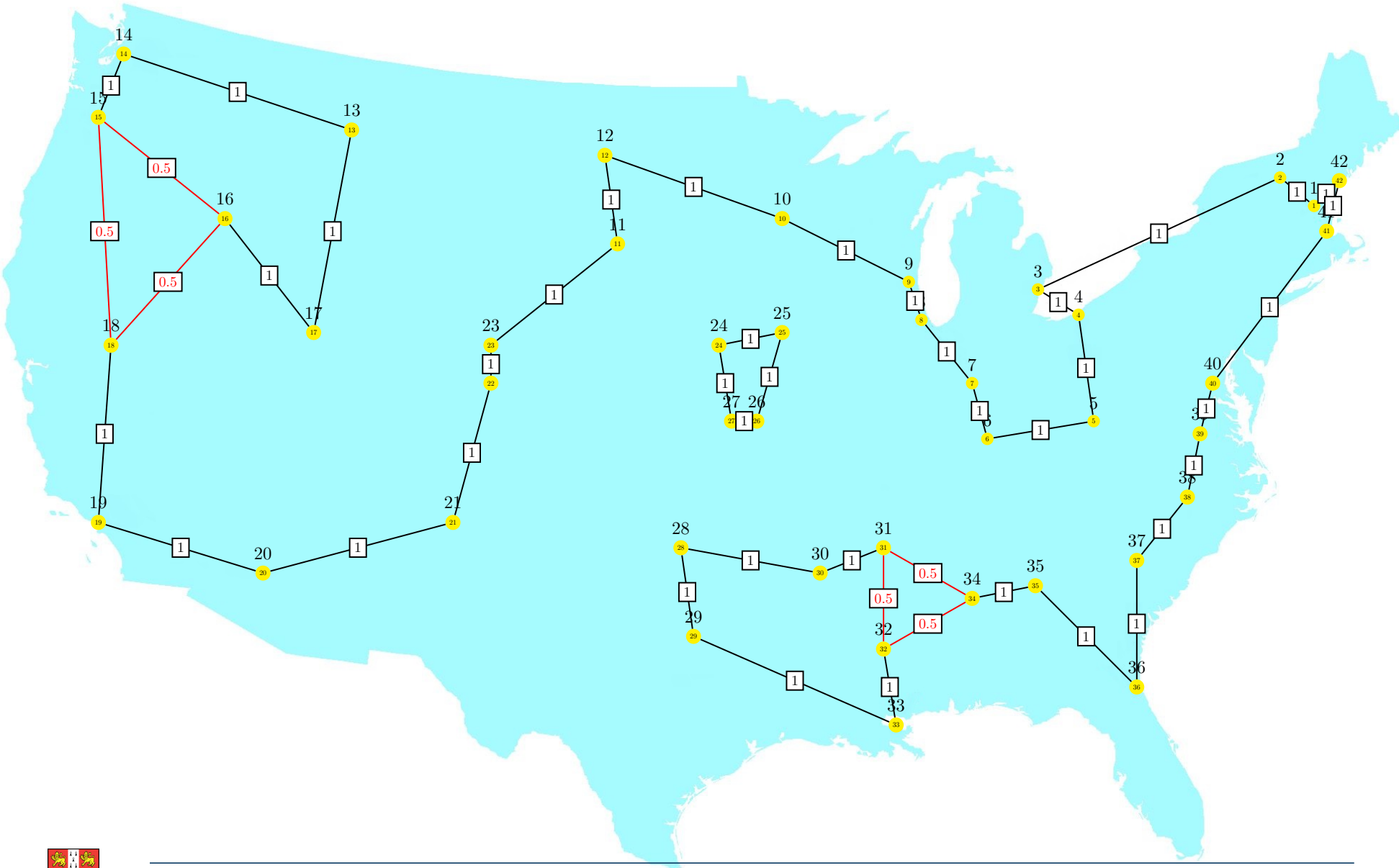
Iteration 2: Eliminate Subtour 3 – 9

Objective value: −676.000000, 861 variables, 946 constraints, 1802 iterations



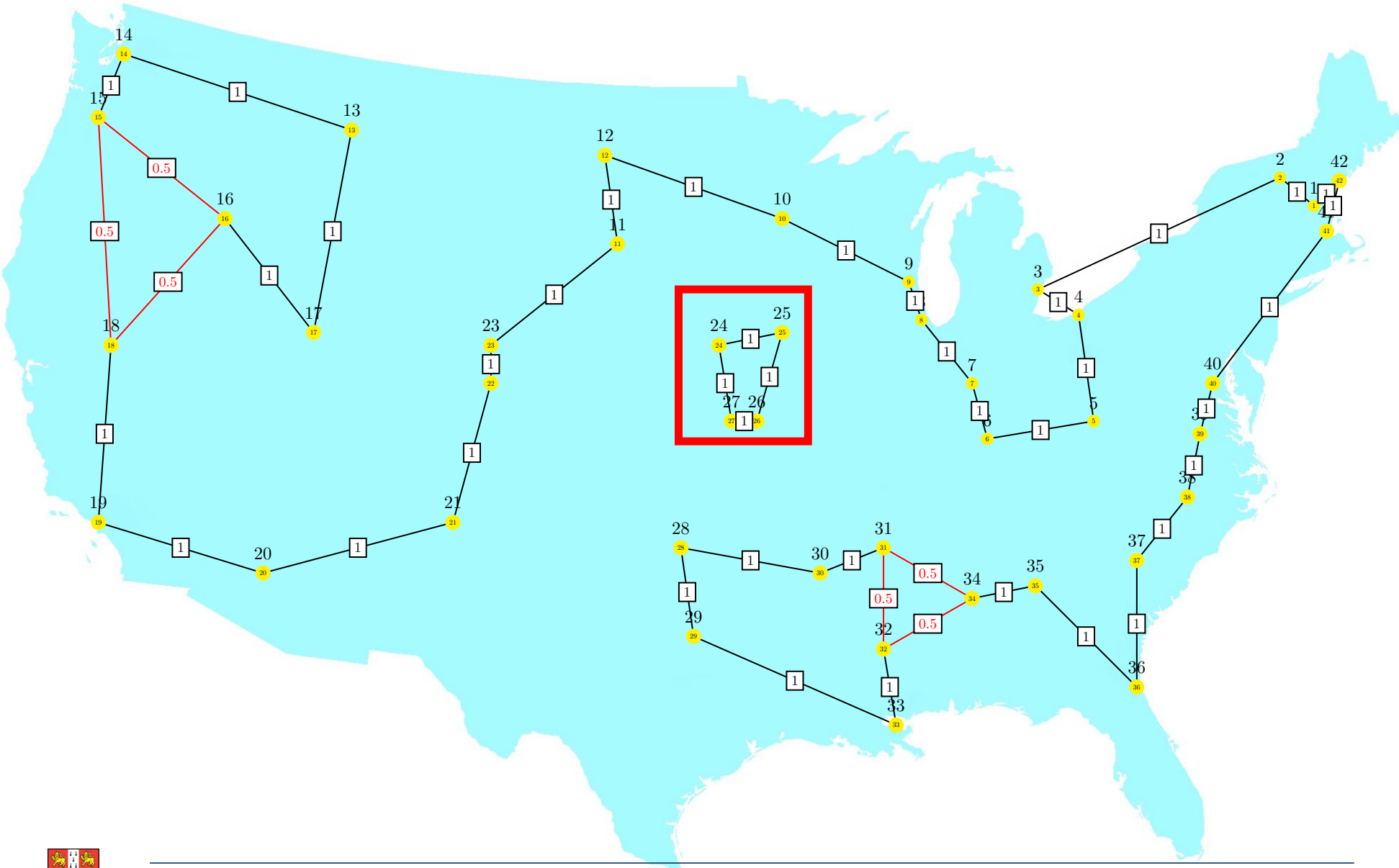
Iteration 3:

Objective value: -681.000000, 861 variables, 947 constraints, 1984 iterations



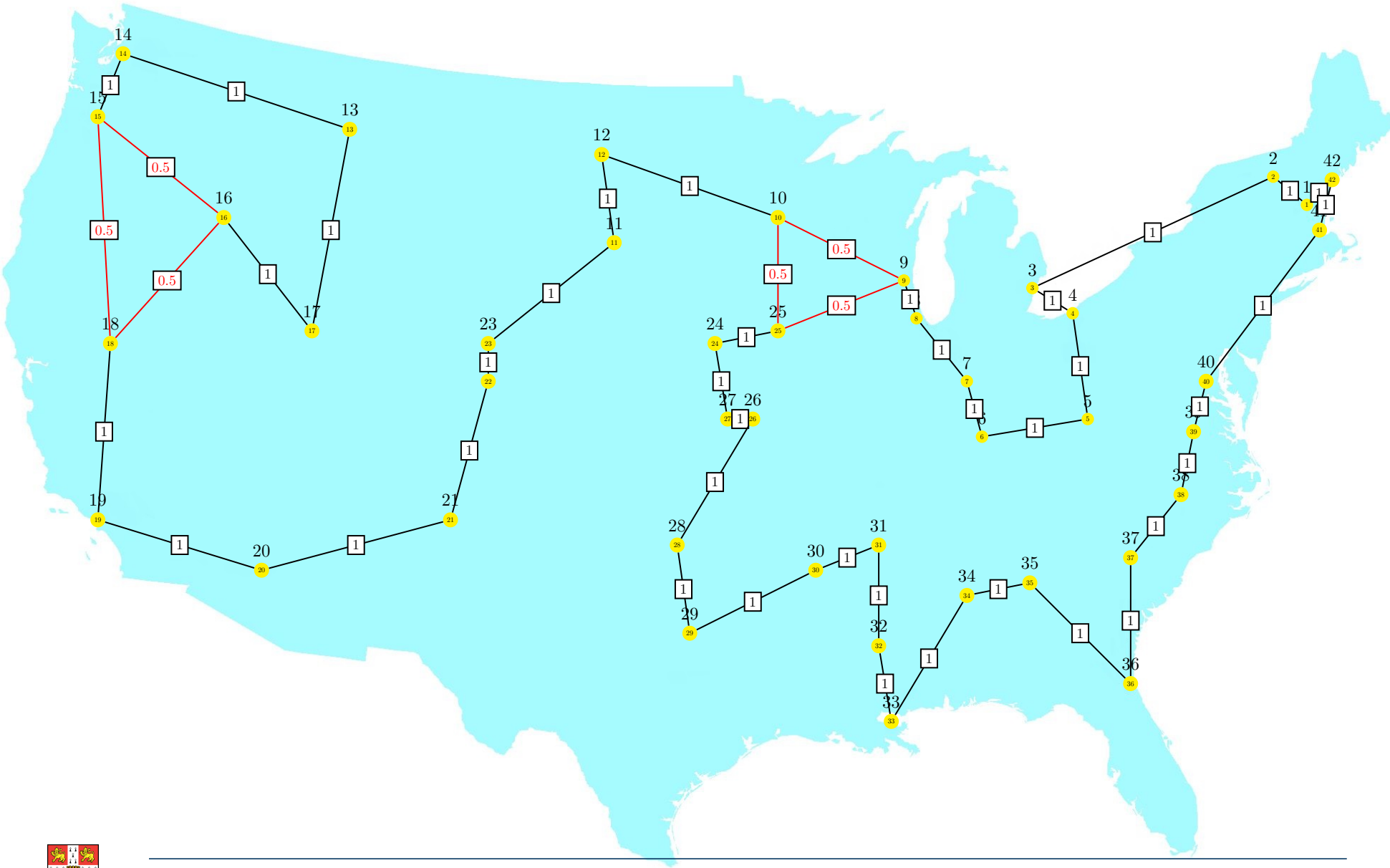
Iteration 3: Eliminate Subtour 24, 25, 26, 27

Objective value: −681.000000, 861 variables, 947 constraints, 1984 iterations



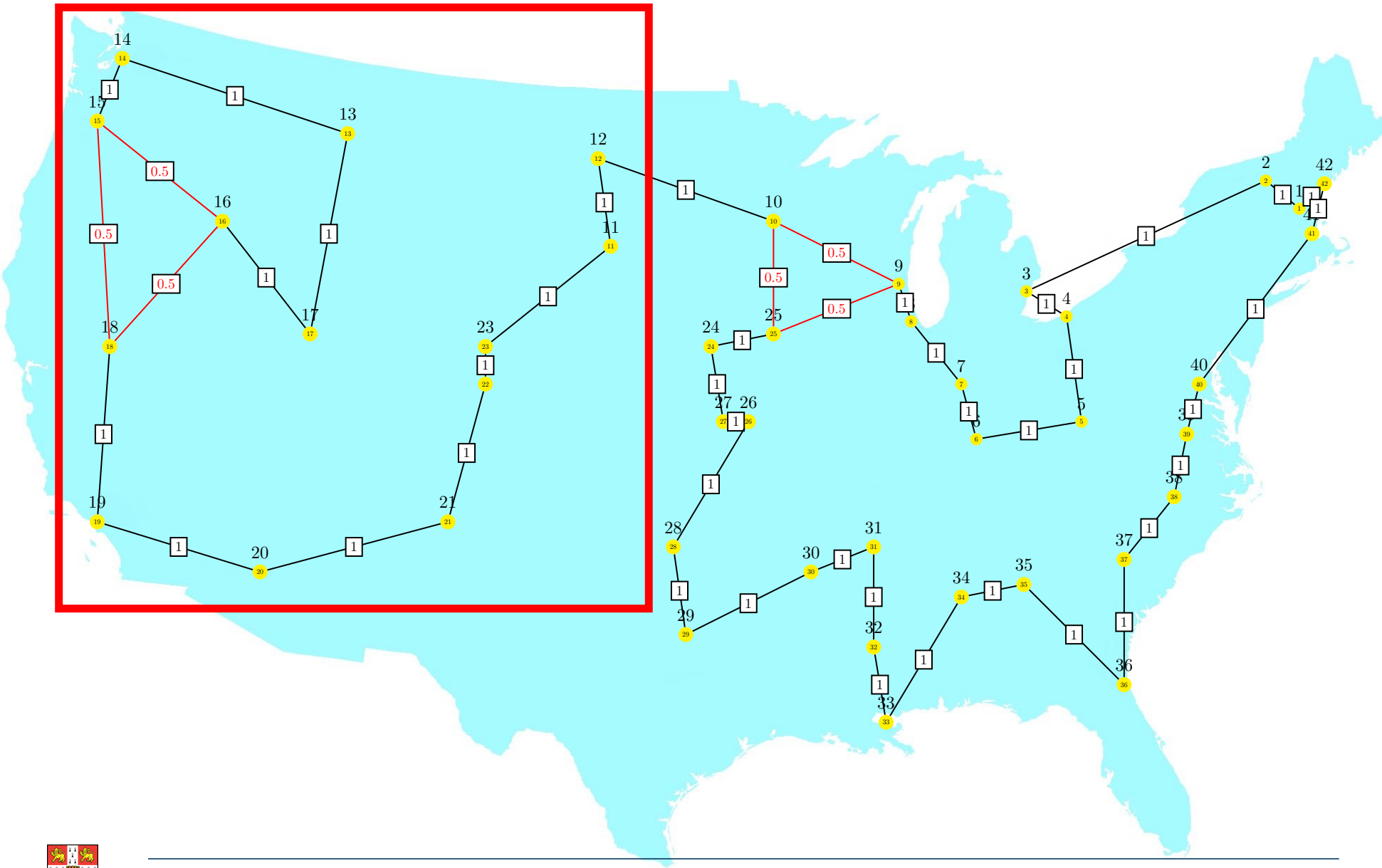
Iteration 4:

Objective value: -682.500000, 861 variables, 948 constraints, 1492 iterations



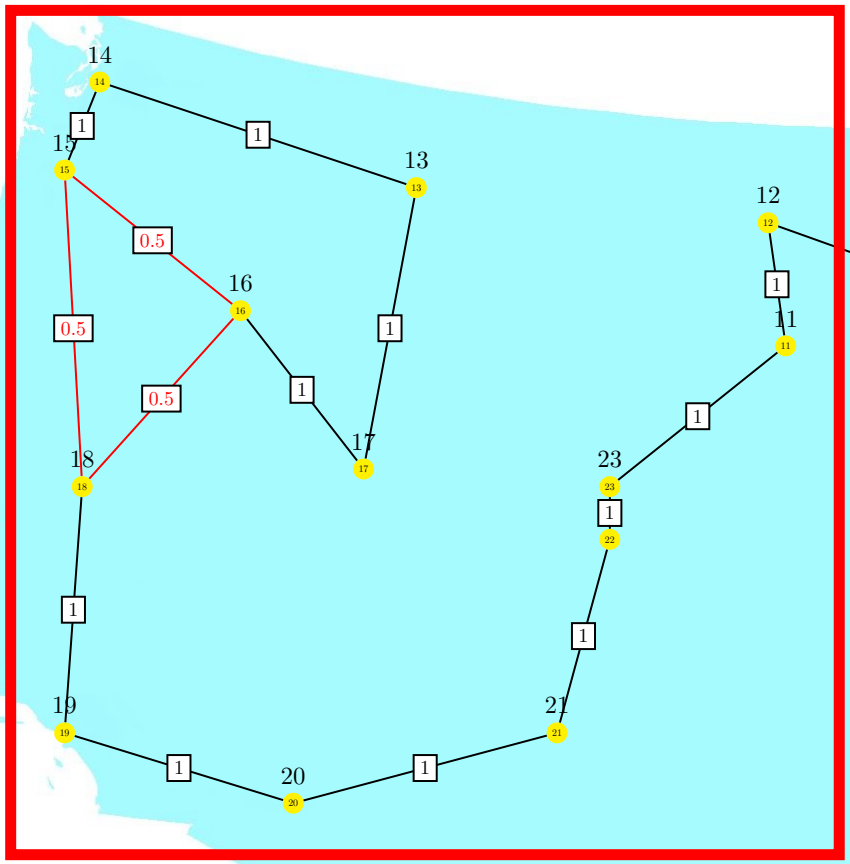
Iteration 4: Eliminate Cut 11 – 23

Objective value: −682.500000, 861 variables, 948 constraints, 1492 iterations



Iteration 4: Eliminate Cut $11 - 23$

Objective value: -682.500000, 861 variables, 948 constraints, 1492 iterations

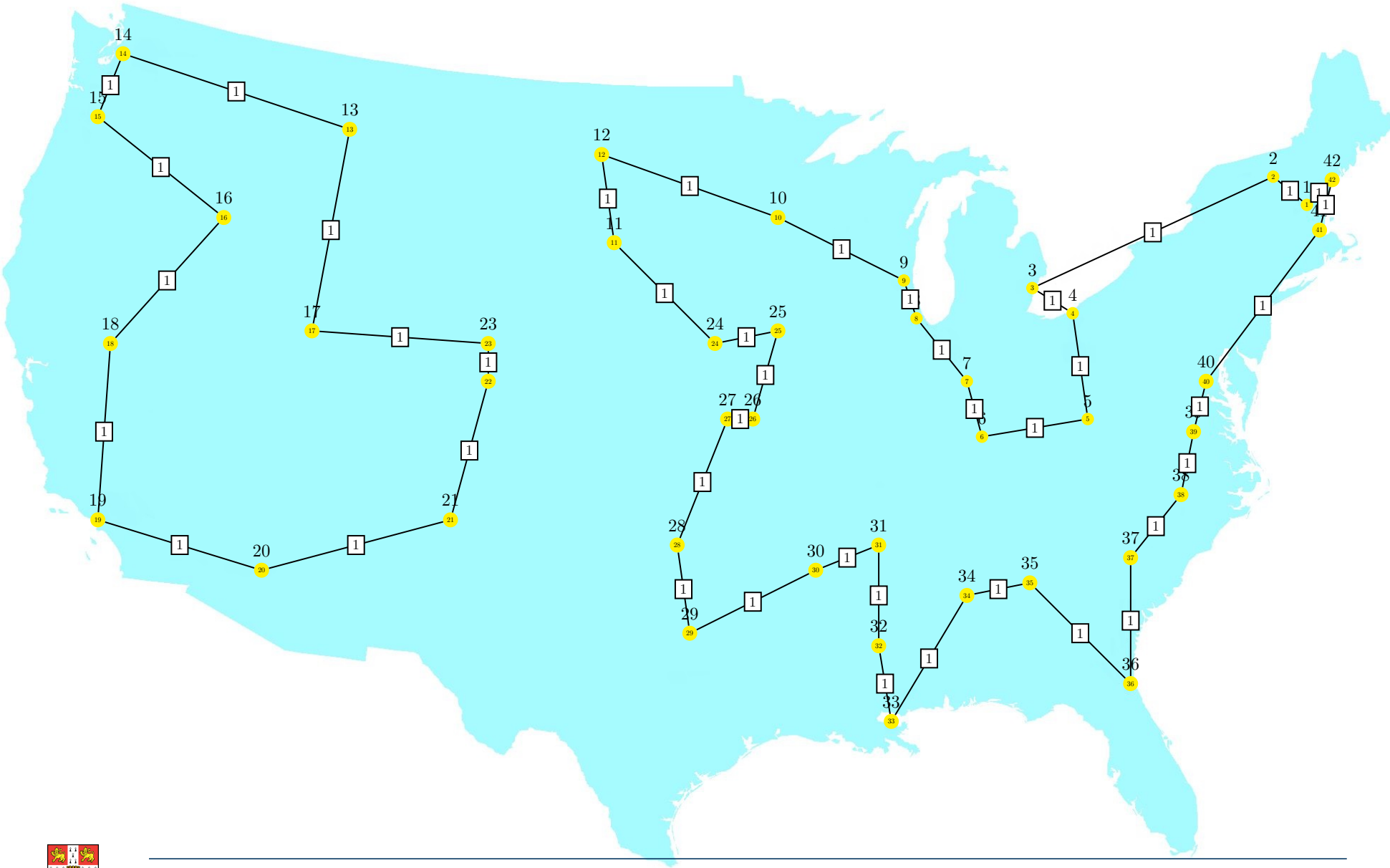


Tour has to include at least two edges between $S = \{11, 12, \ldots, 23\}$ and $V \setminus S$:

$$\sum_{i \in S, j \in V \setminus S} x(\max(i,j), \min(i,j)) \geq 2.$$

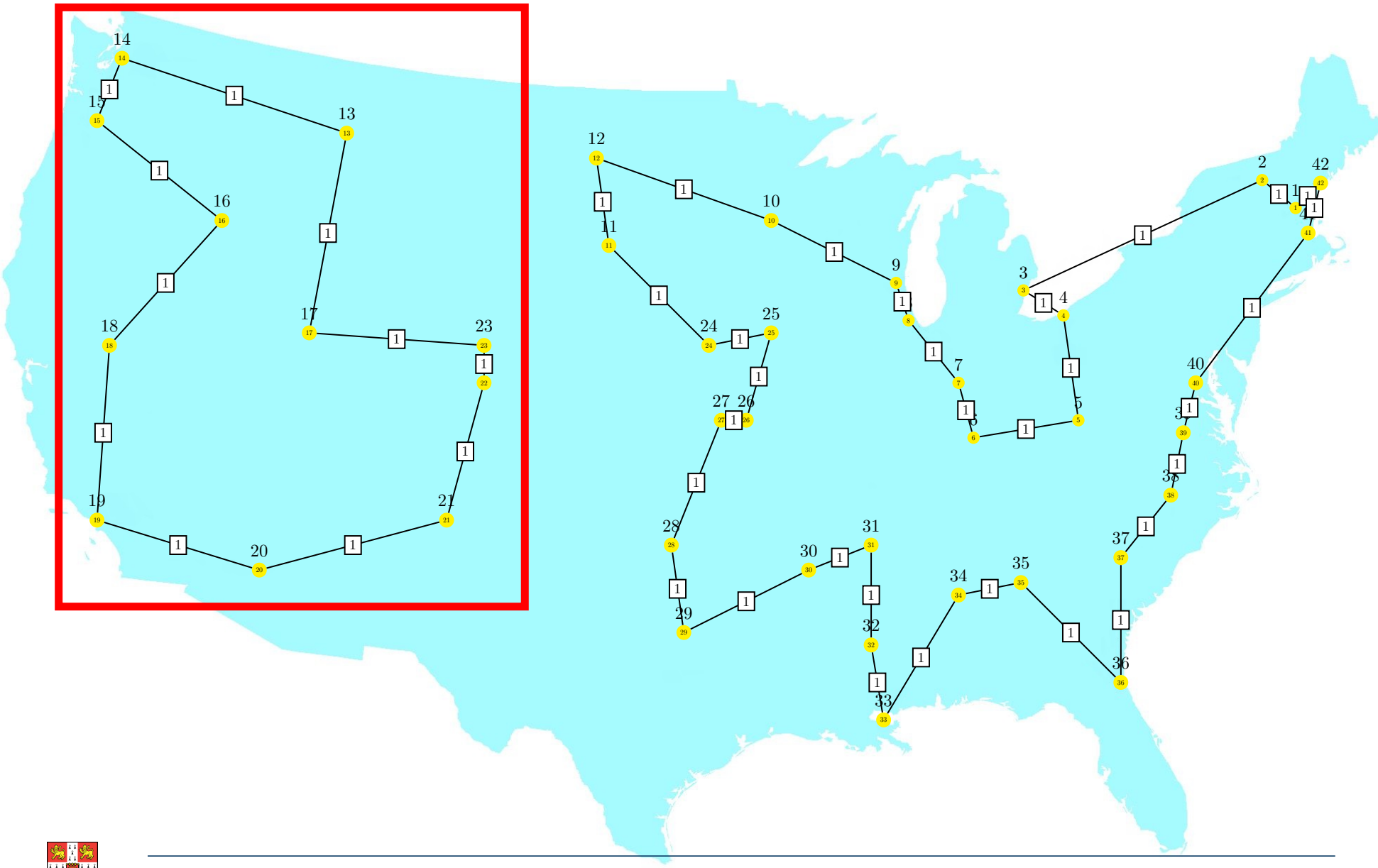
Iteration 5:

Objective value: -686.000000, 861 variables, 949 constraints, 2446 iterations



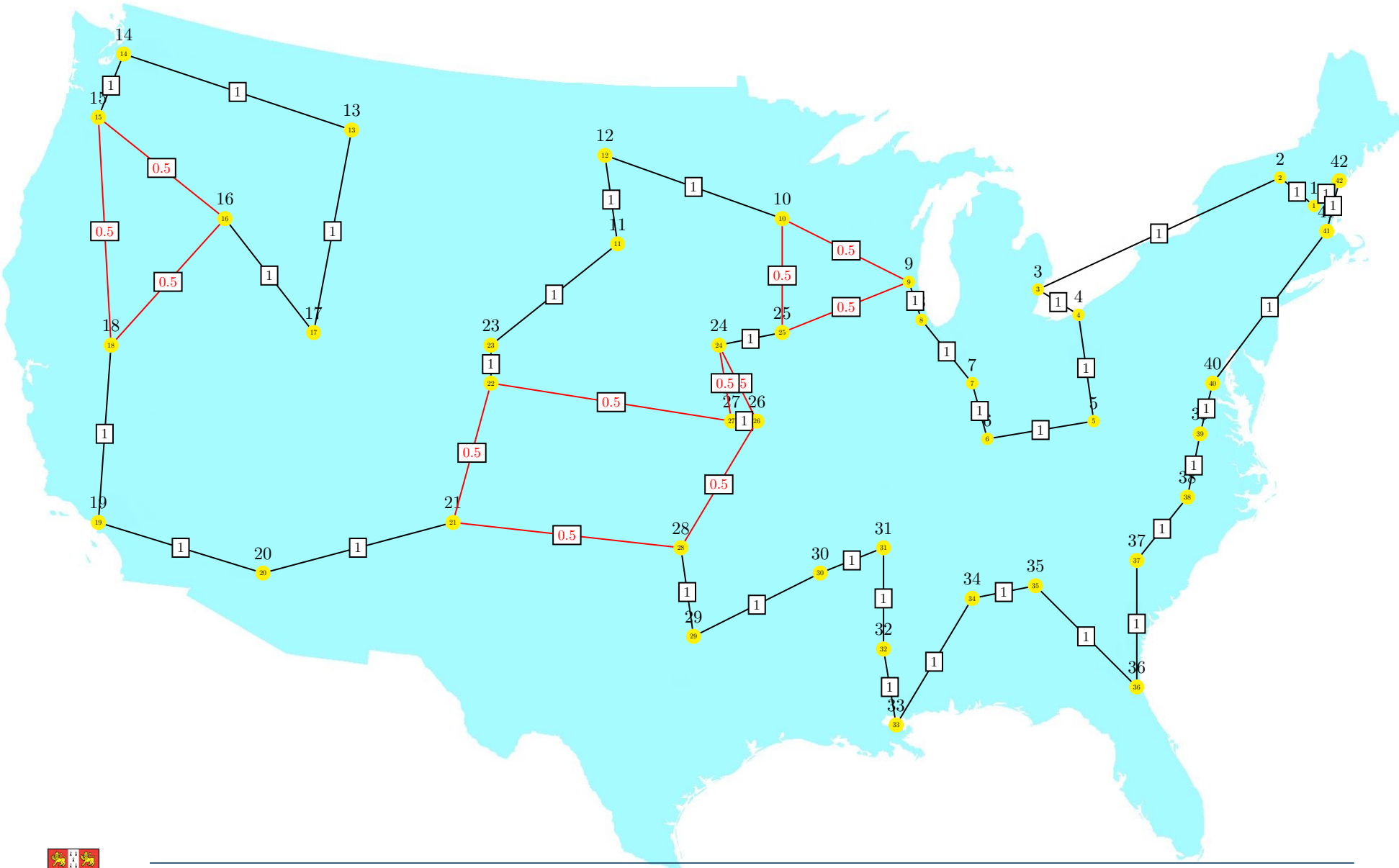
Iteration 5: Eliminate Subtour 13 – 23

Objective value: −686.000000, 861 variables, 949 constraints, 2446 iterations



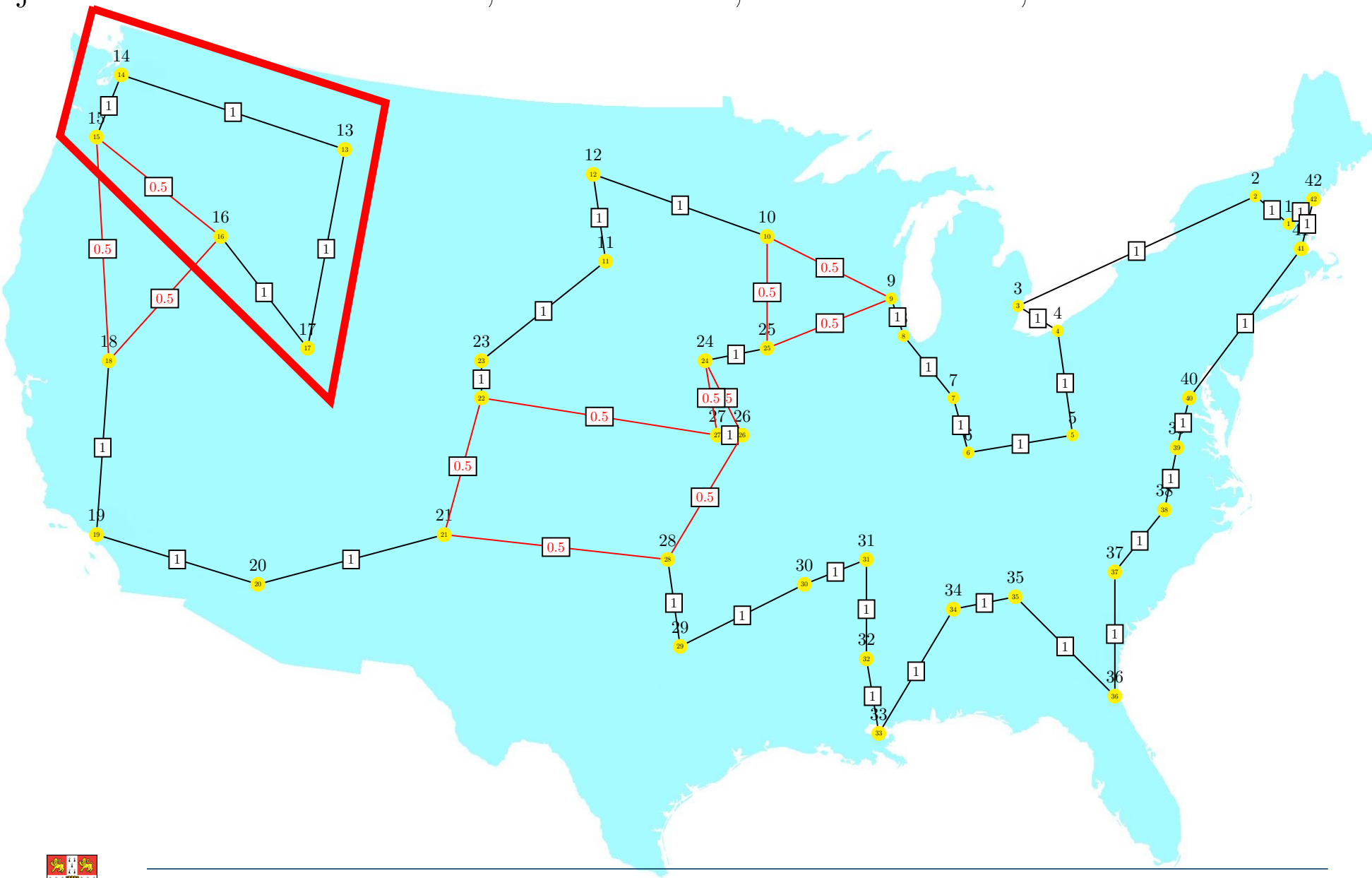
Iteration 6:

Objective value: -694.500000, 861 variables, 950 constraints, 1690 iterations



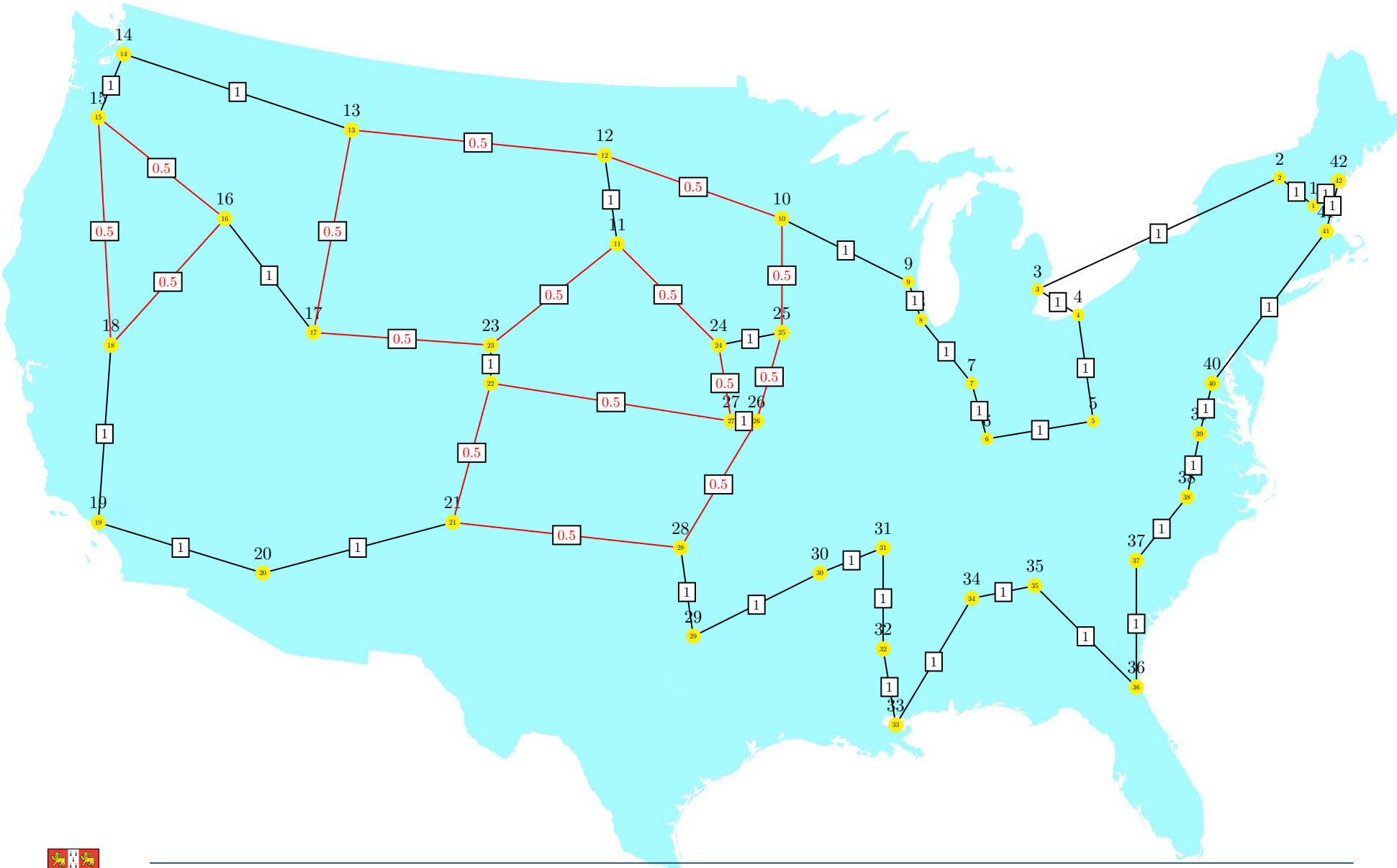
Iteration 6: Eliminate Cut 13 – 17

Objective value: −694.500000, 861 variables, 950 constraints, 1690 iterations



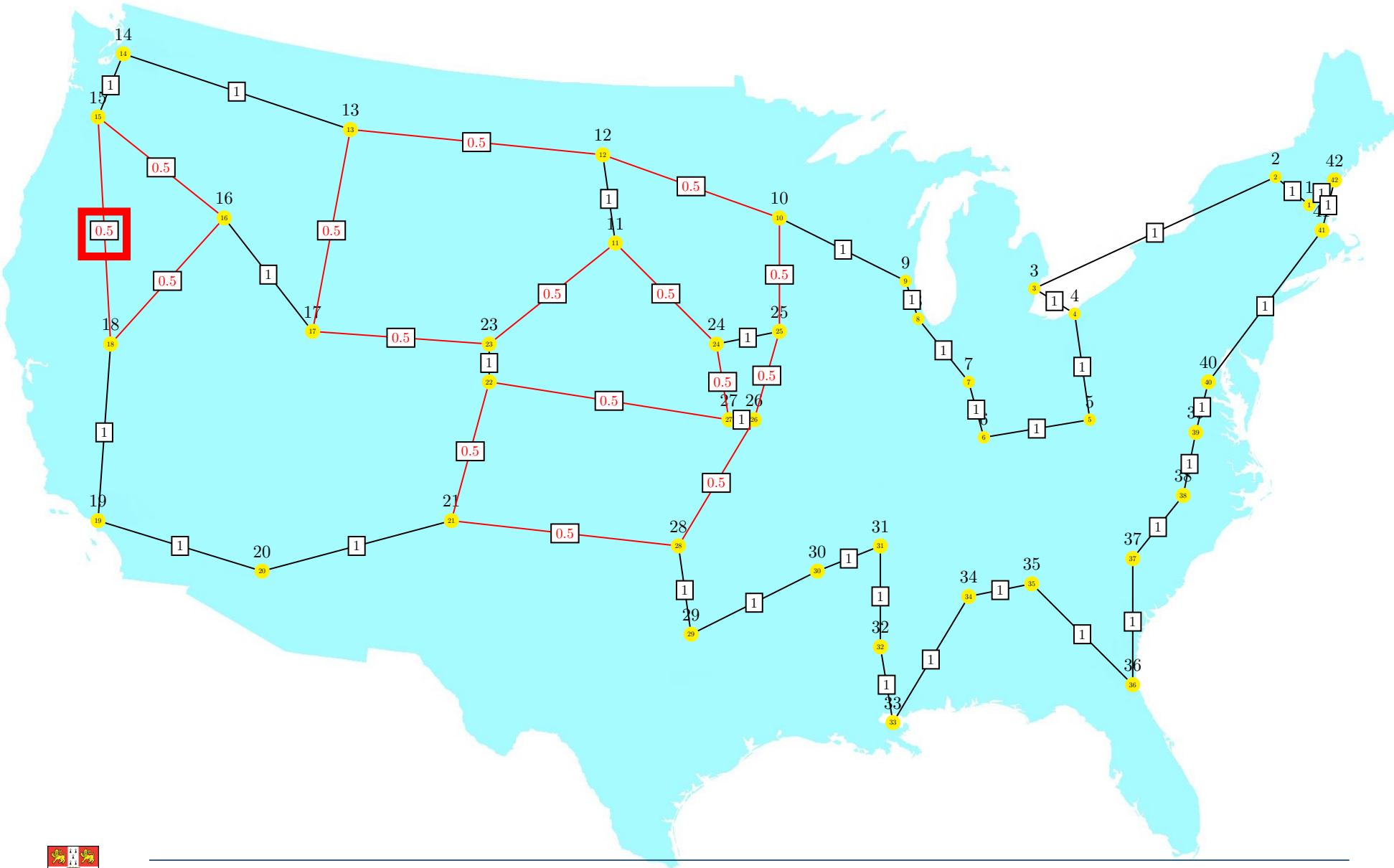
Iteration 7:

Objective value: -697.000000, 861 variables, 951 constraints, 2212 iterations



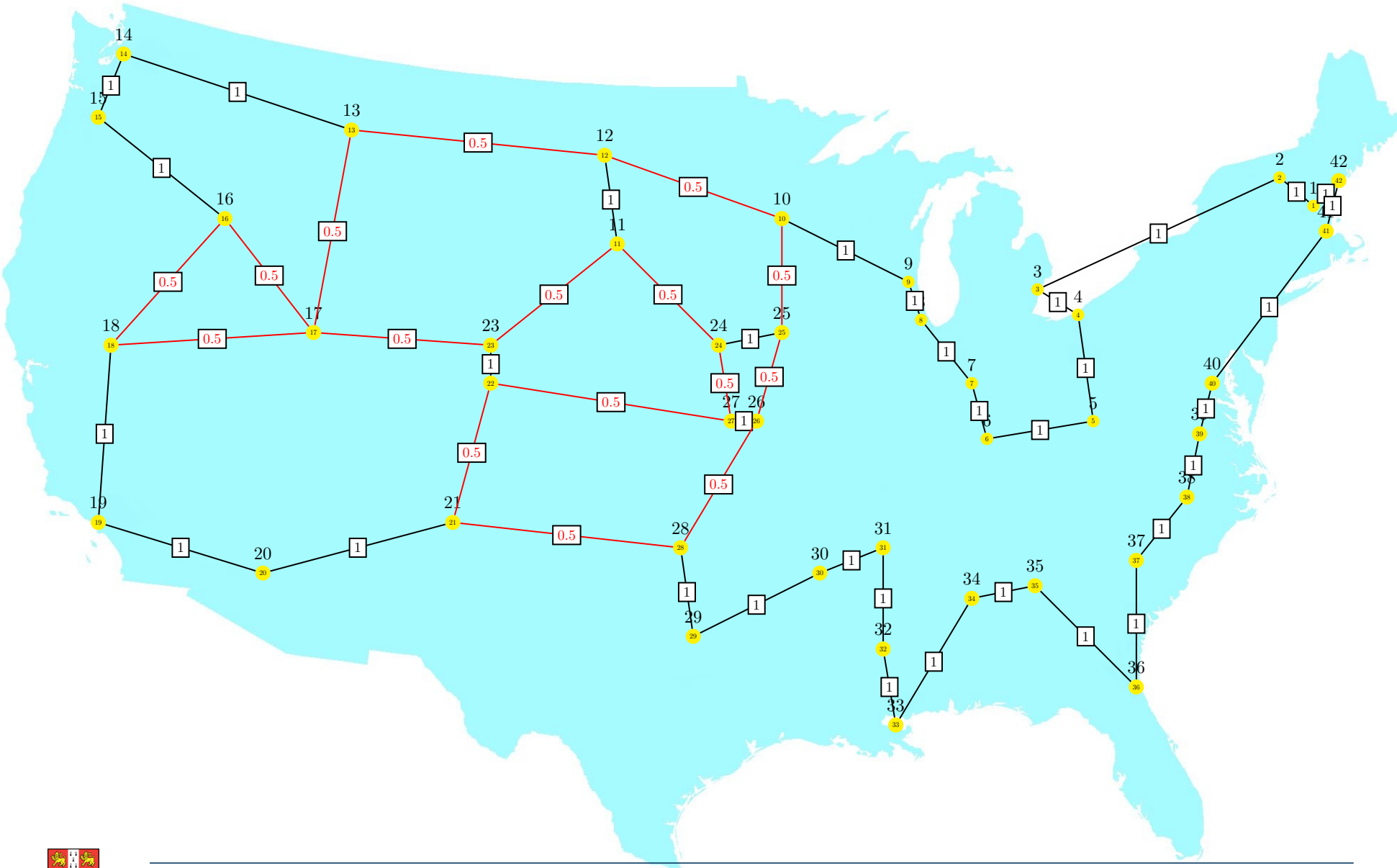
Iteration 7: Branch 1a $x_{15,18} = 0$

Objective value: -697.000000, 861 variables, 951 constraints, 2212 iterations



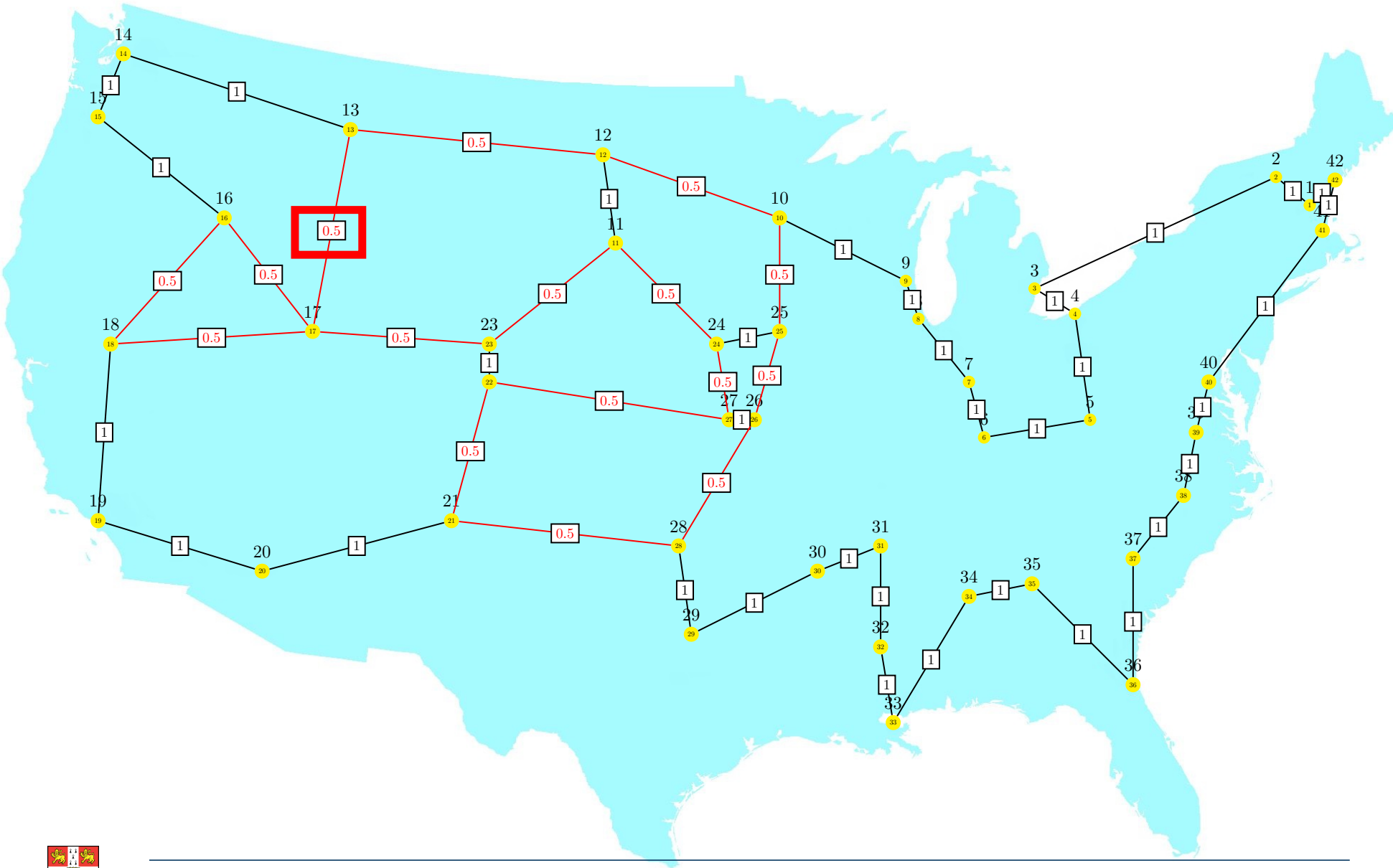
Iteration 8:

Objective value: -698.000000, 861 variables, 952 constraints, 1878 iterations



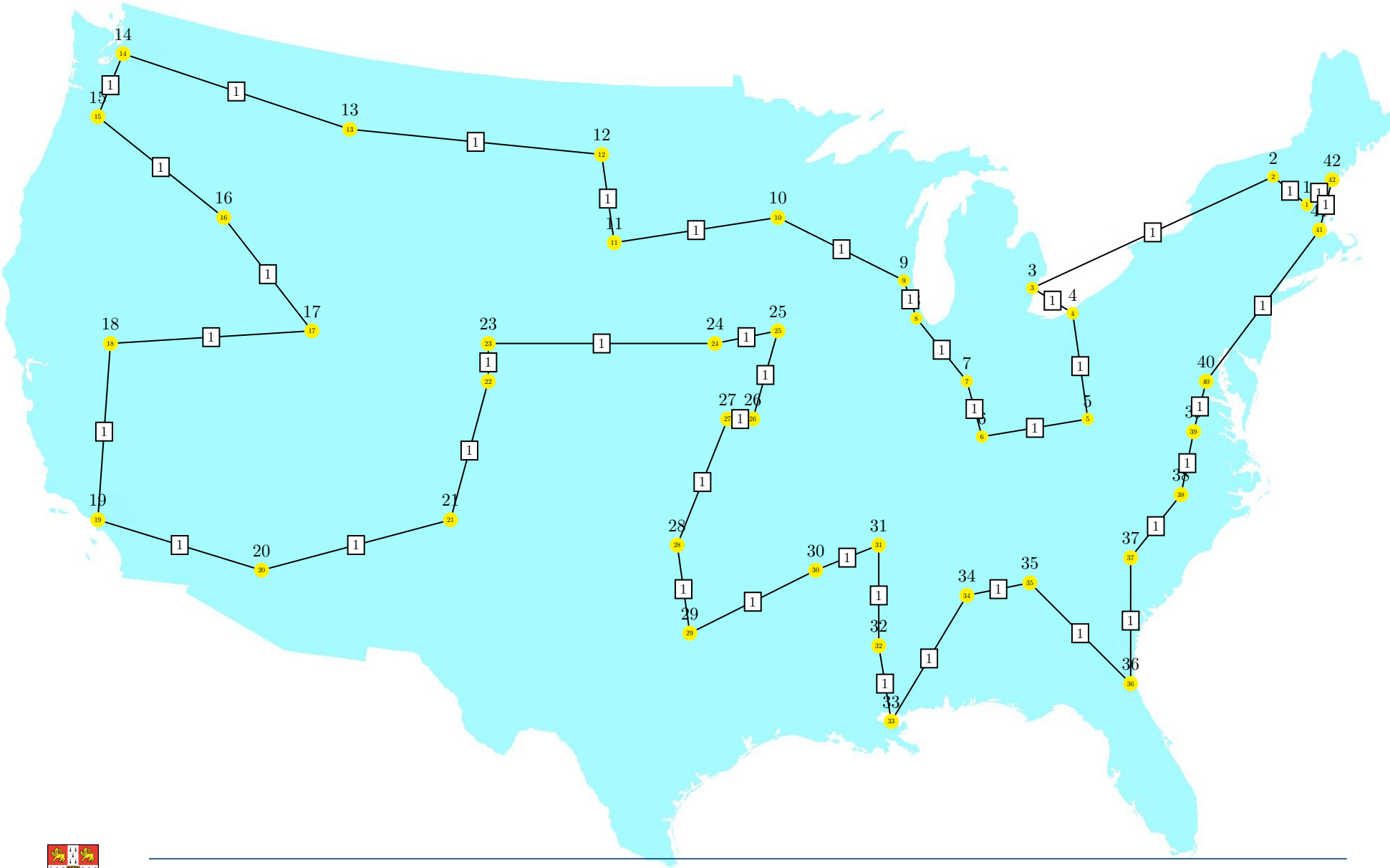
Iteration 8: Branch 2a $x_{13,17} = 0$

Objective value: -698.000000, 861 variables, 952 constraints, 1878 iterations



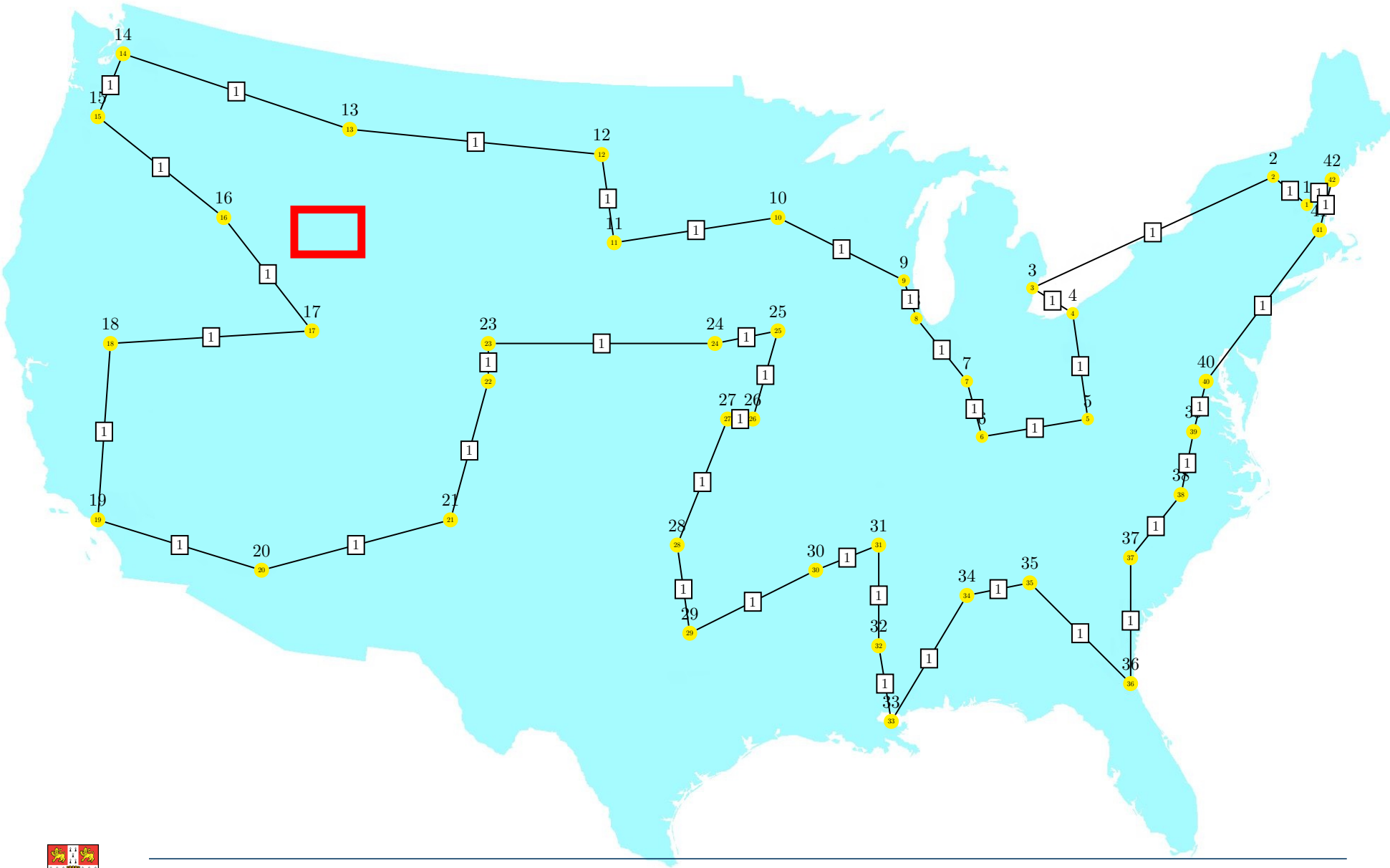
Iteration 9:

Objective value: -699.000000, 861 variables, 953 constraints, 2281 iterations



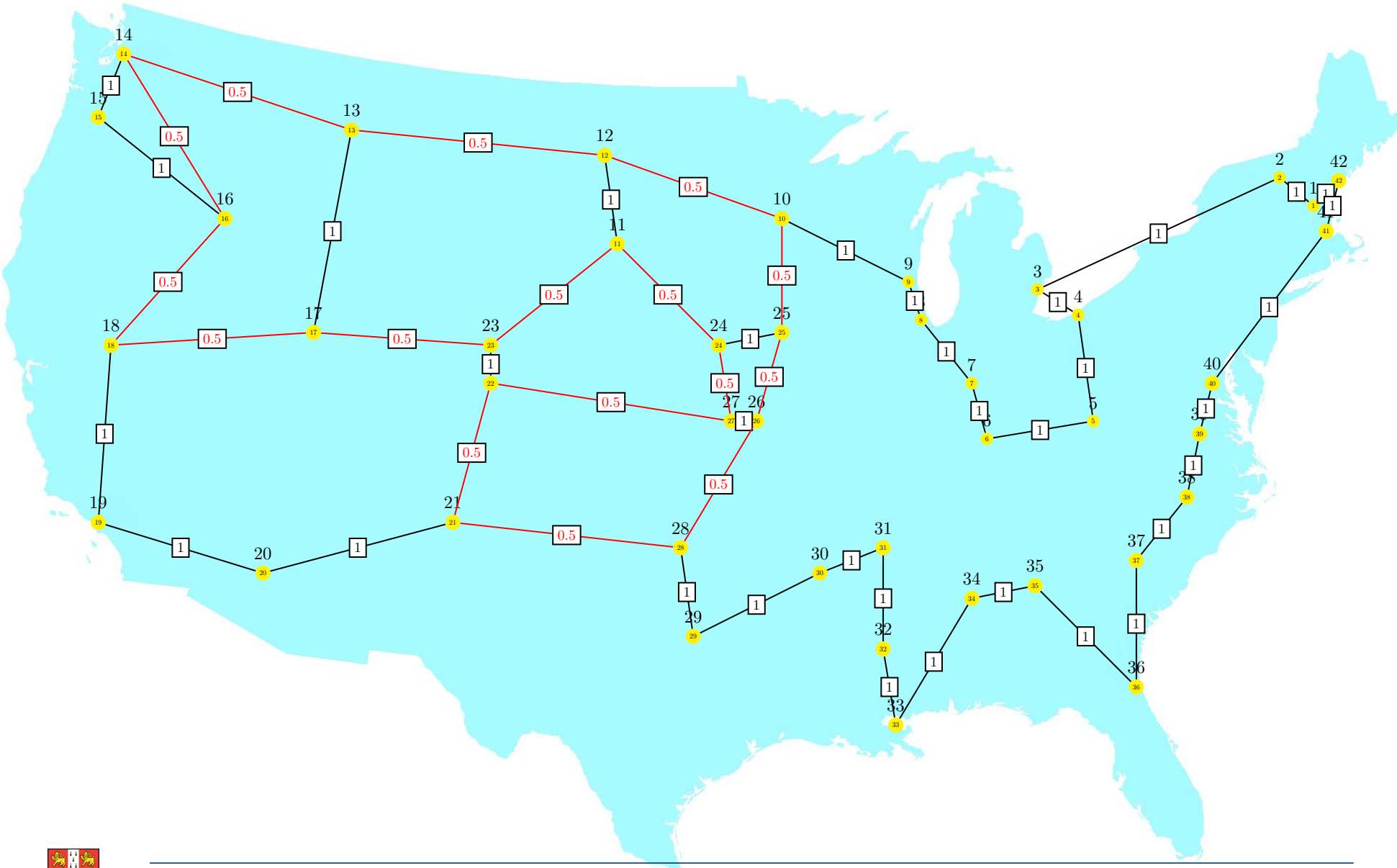
Iteration 9: Branch 2b $x_{13,17} = 1$

Objective value: -699.000000, 861 variables, 953 constraints, 2281 iterations



Iteration 10:

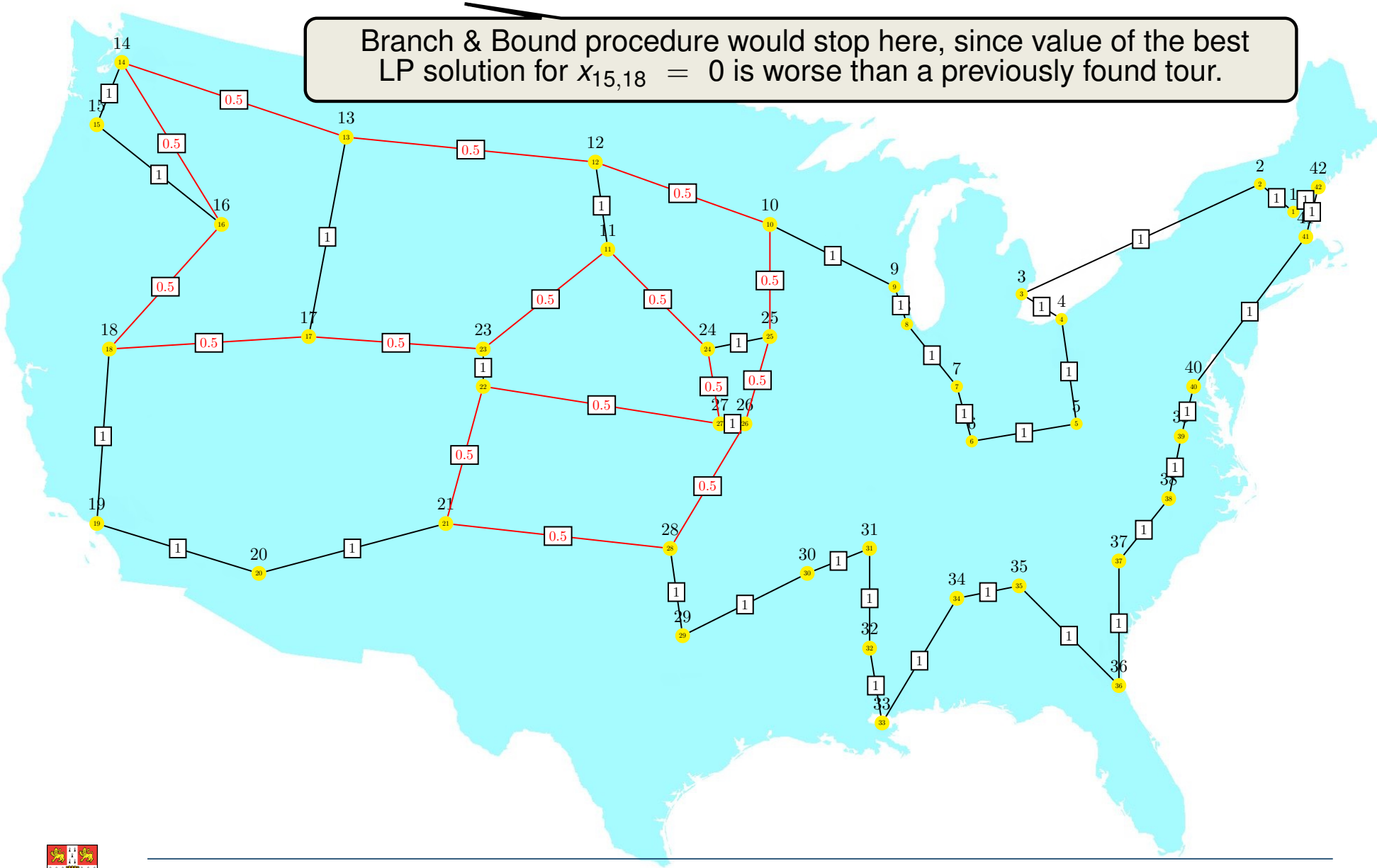
Objective value: -700.000000, 861 variables, 954 constraints, 2398 iterations



Iteration 10:

Objective value: -700.000000, 861 variables, 954 constraints, 2398 iterations

Branch & Bound procedure would stop here, since value of the best LP solution for $x_{15,18} = 0$ is worse than a previously found tour.



Iteration 10: Branch 1b $x_{15,18} = 1$

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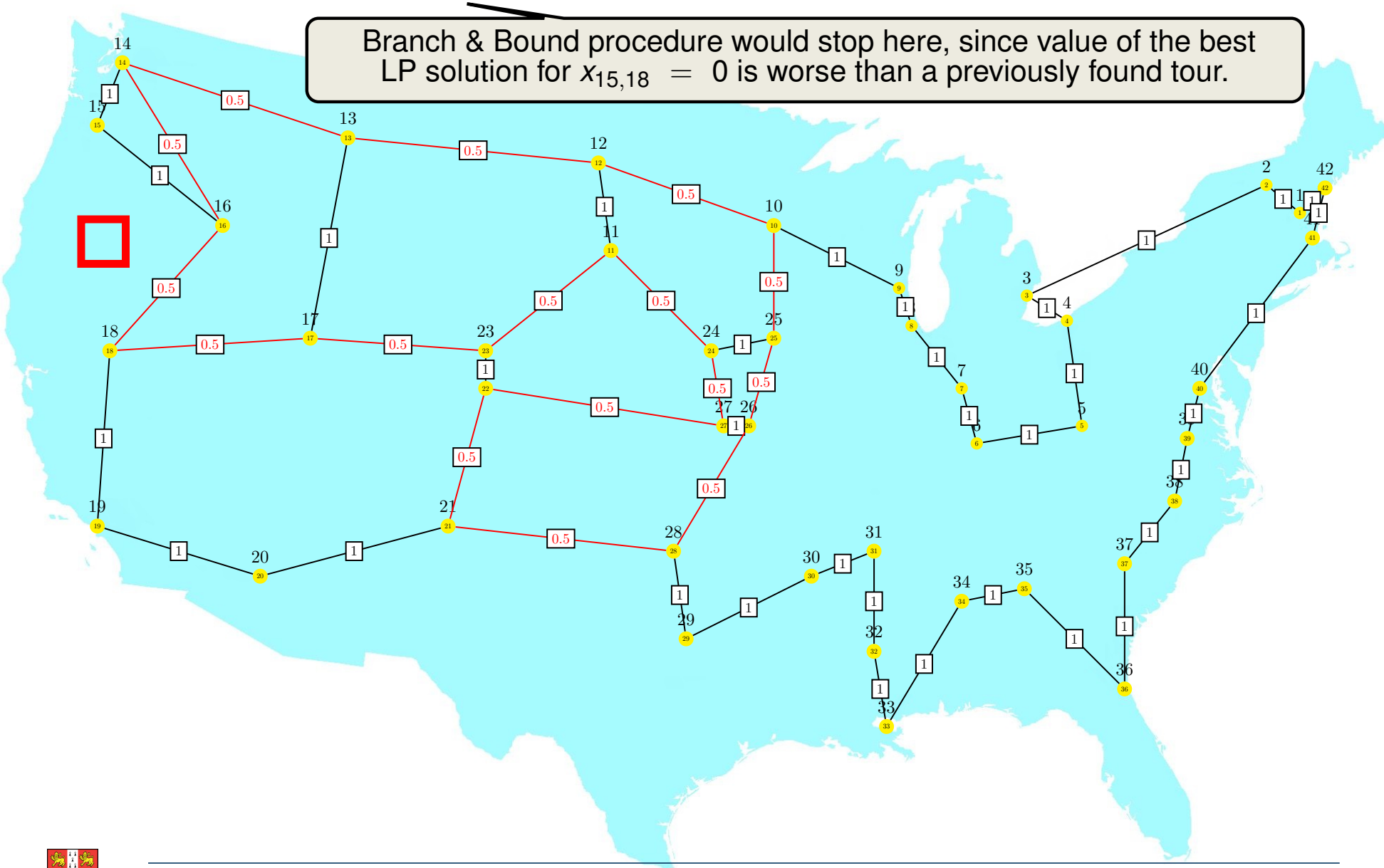
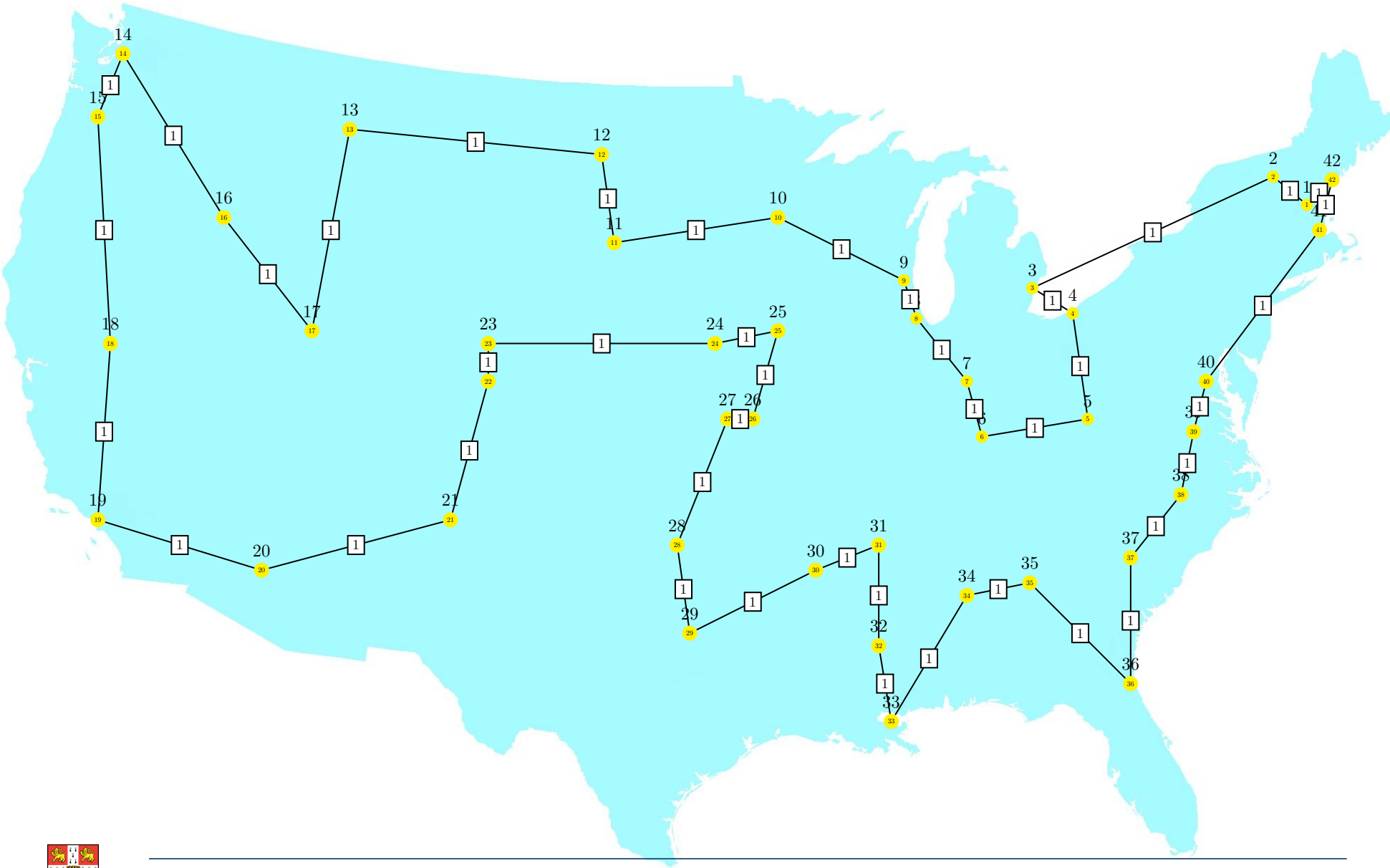


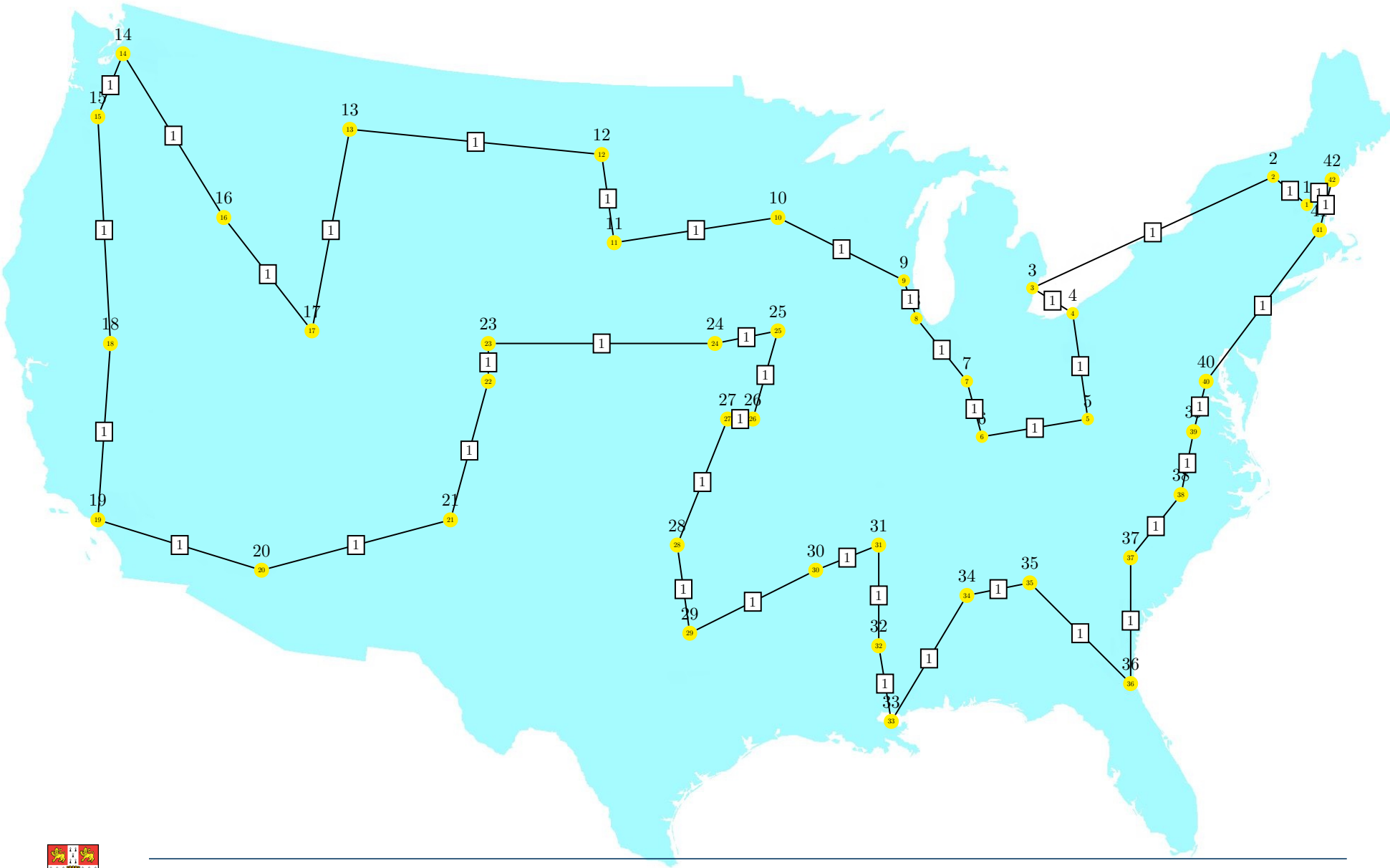
Iteration 11:

Objective value: -701.000000, 861 variables, 953 constraints, 2506 iterations



Iteration 11: Branch & Bound terminates

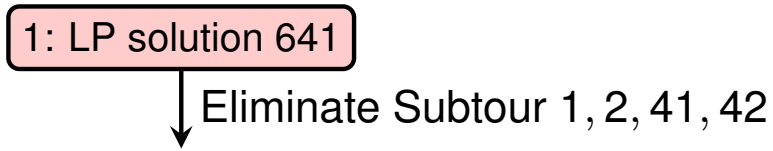
Objective value: -701.000000, 861 variables, 953 constraints, 2506 iterations



Branch & Bound Overview

1: LP solution 641

Branch & Bound Overview



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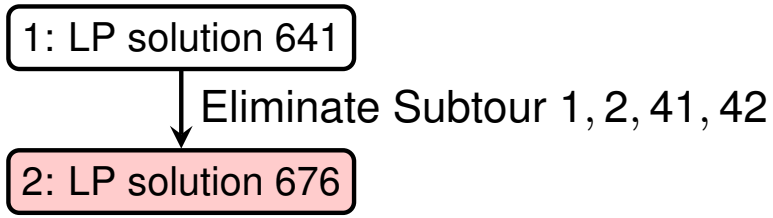

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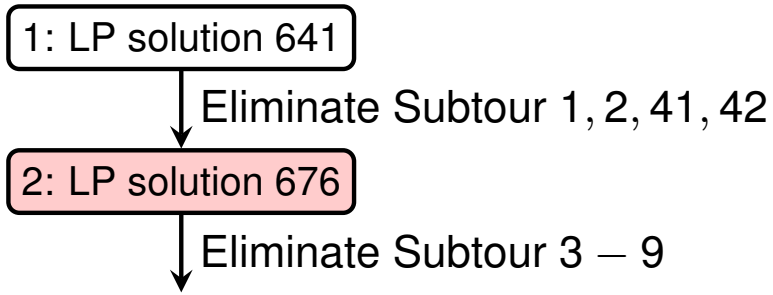

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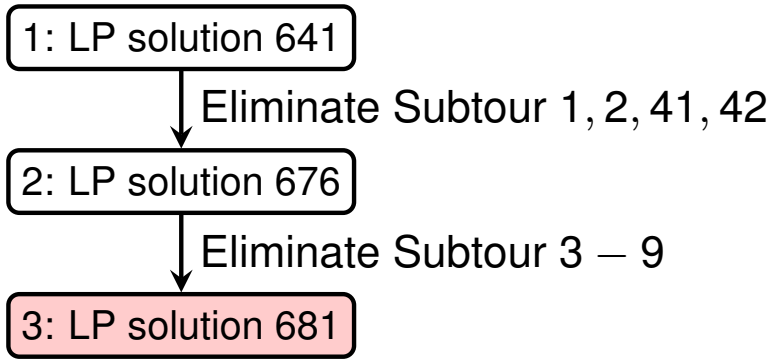

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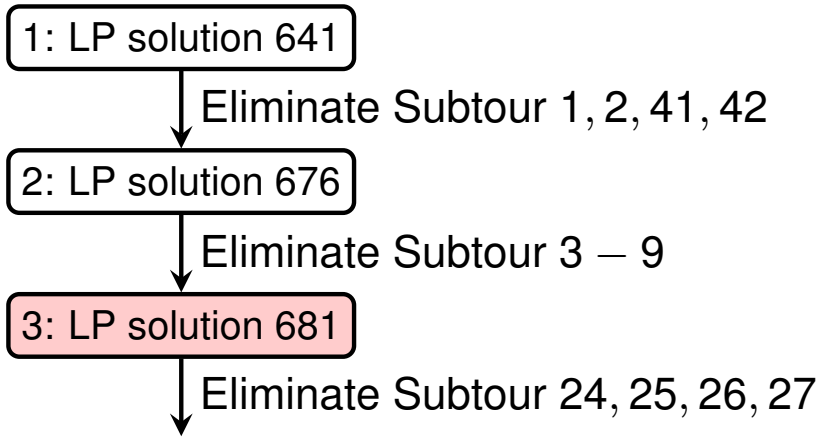

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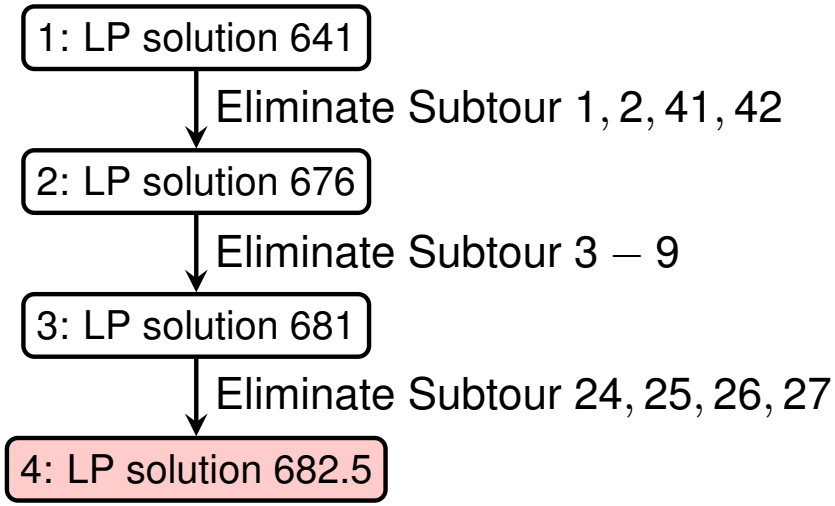

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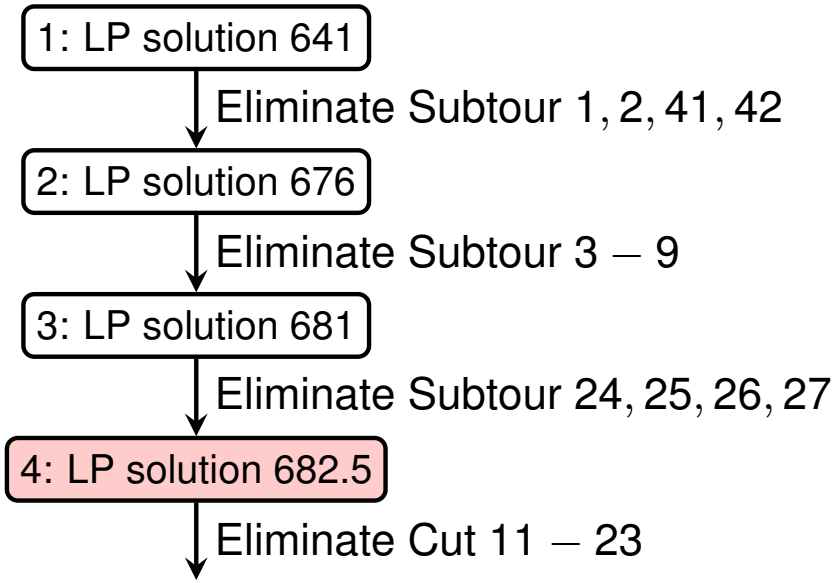

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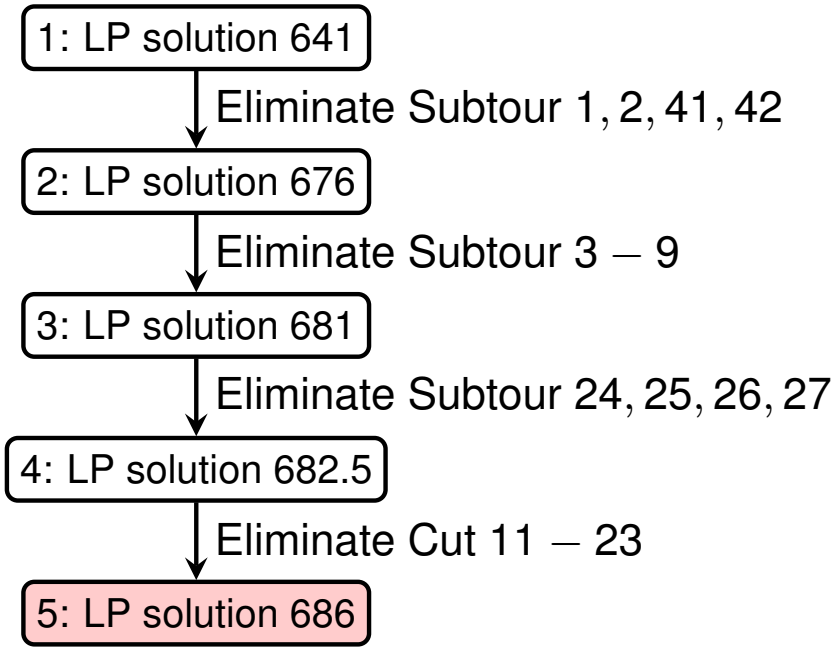

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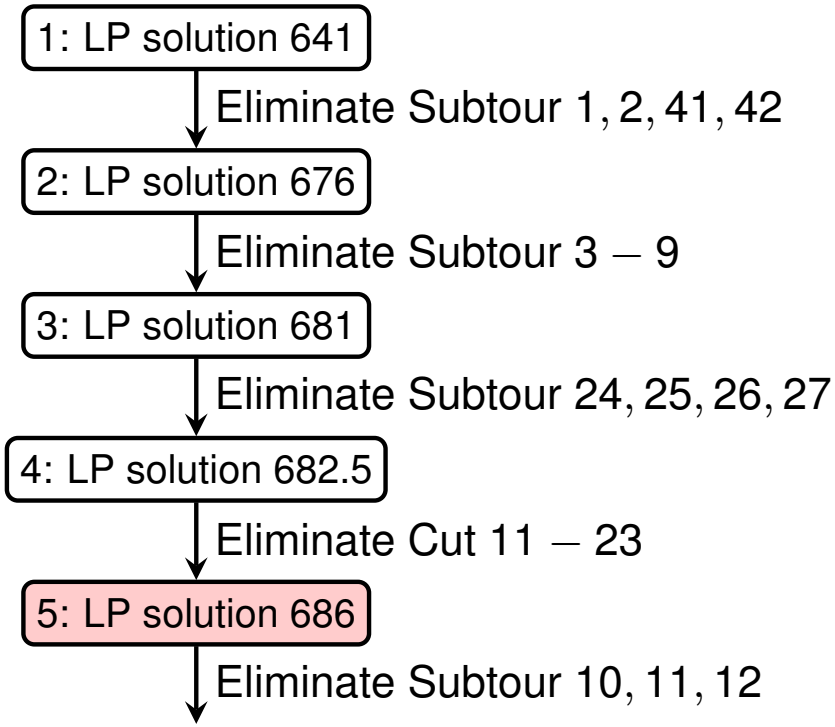

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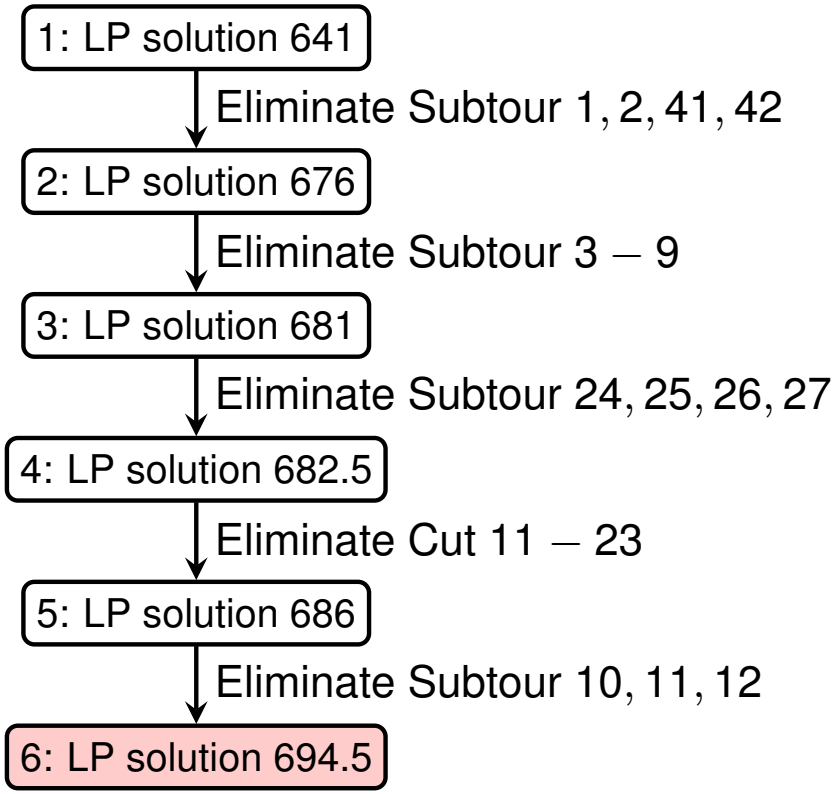

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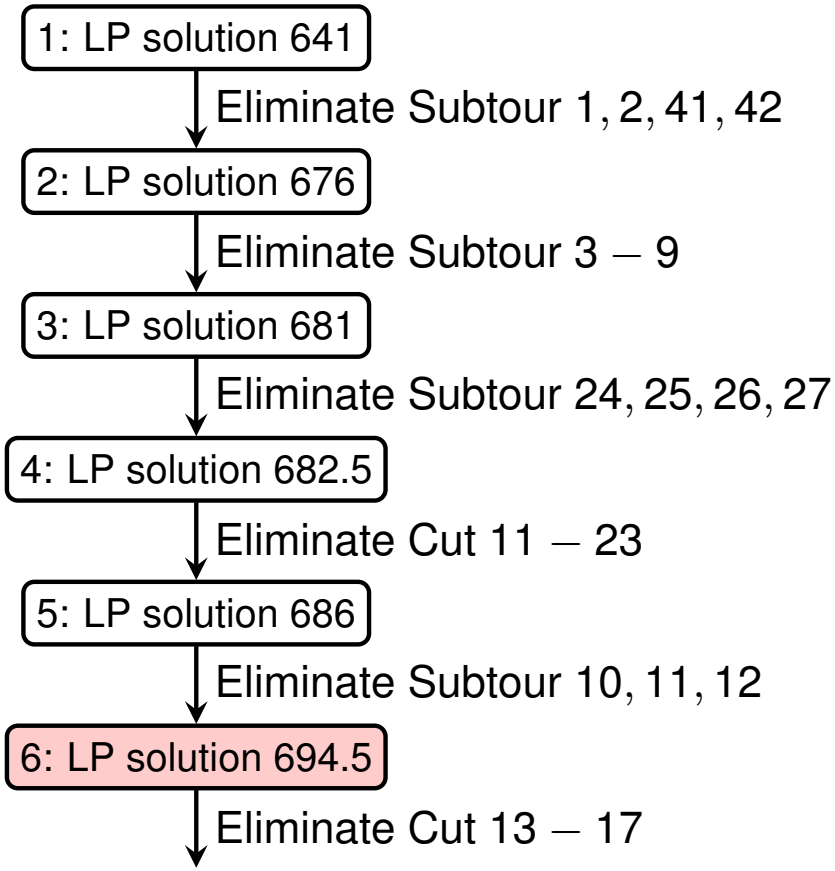

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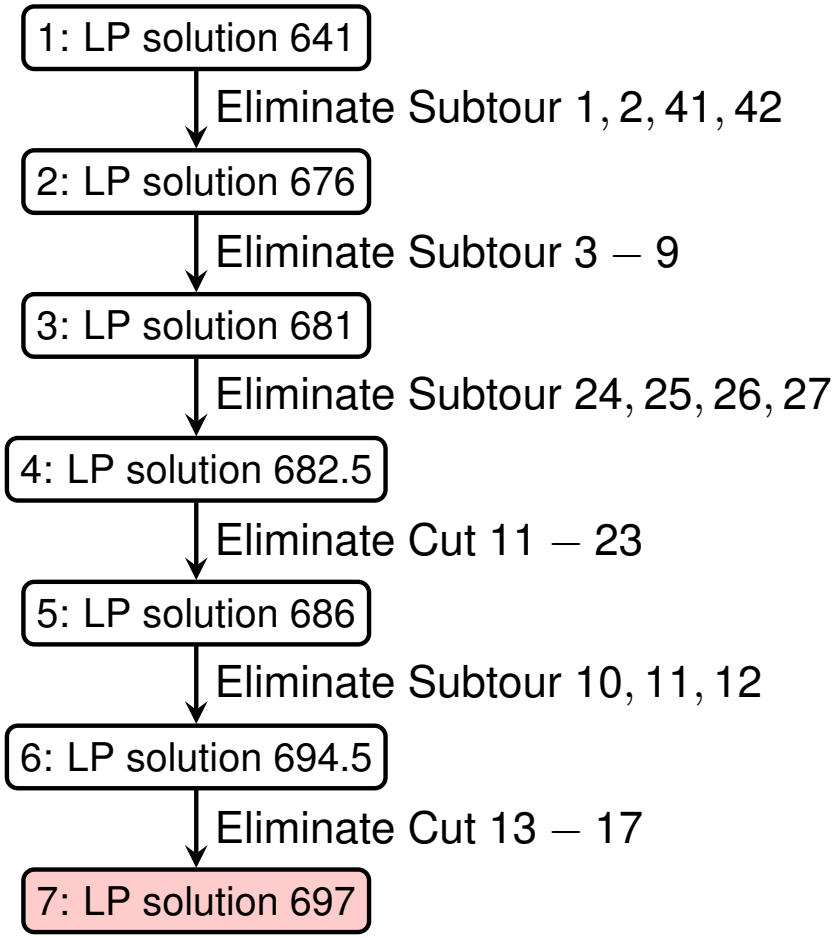

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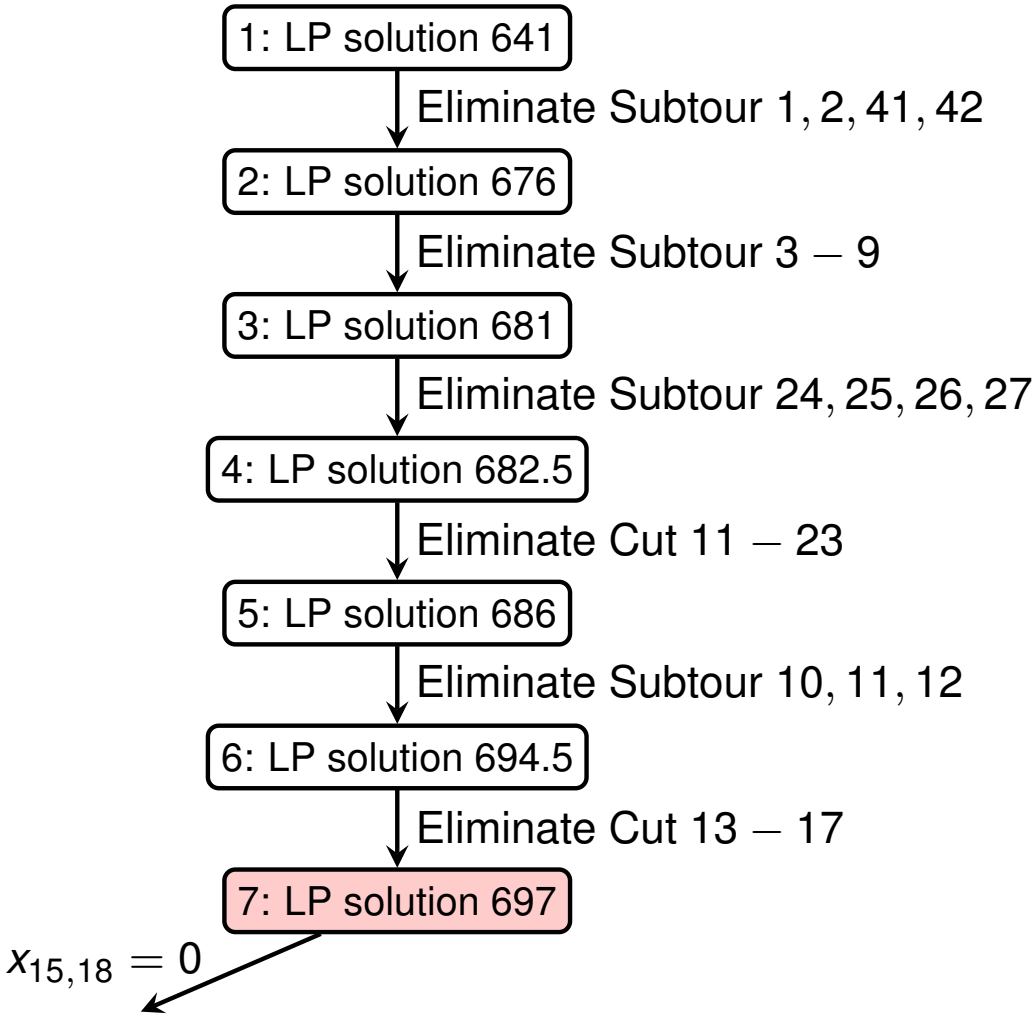

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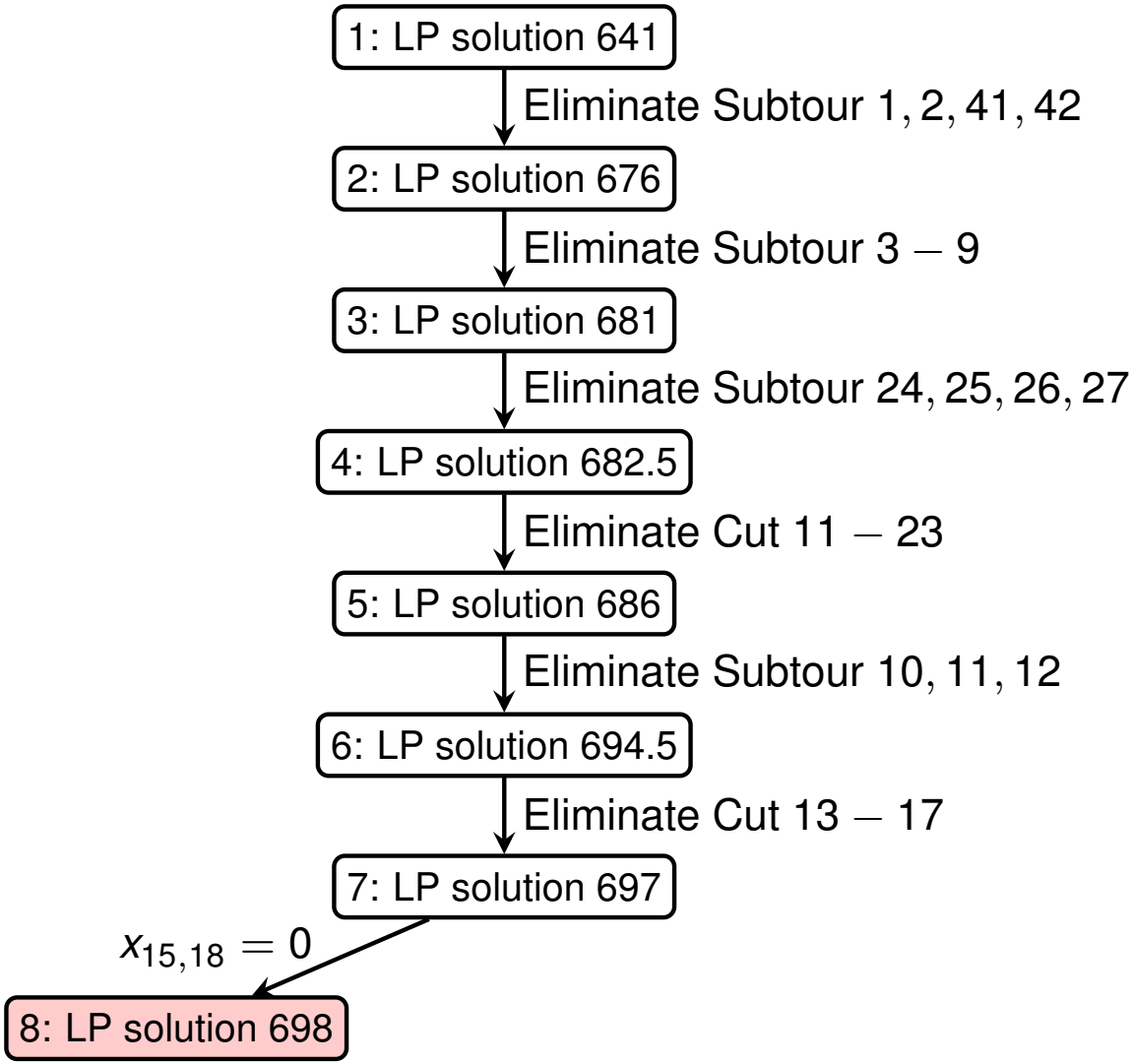

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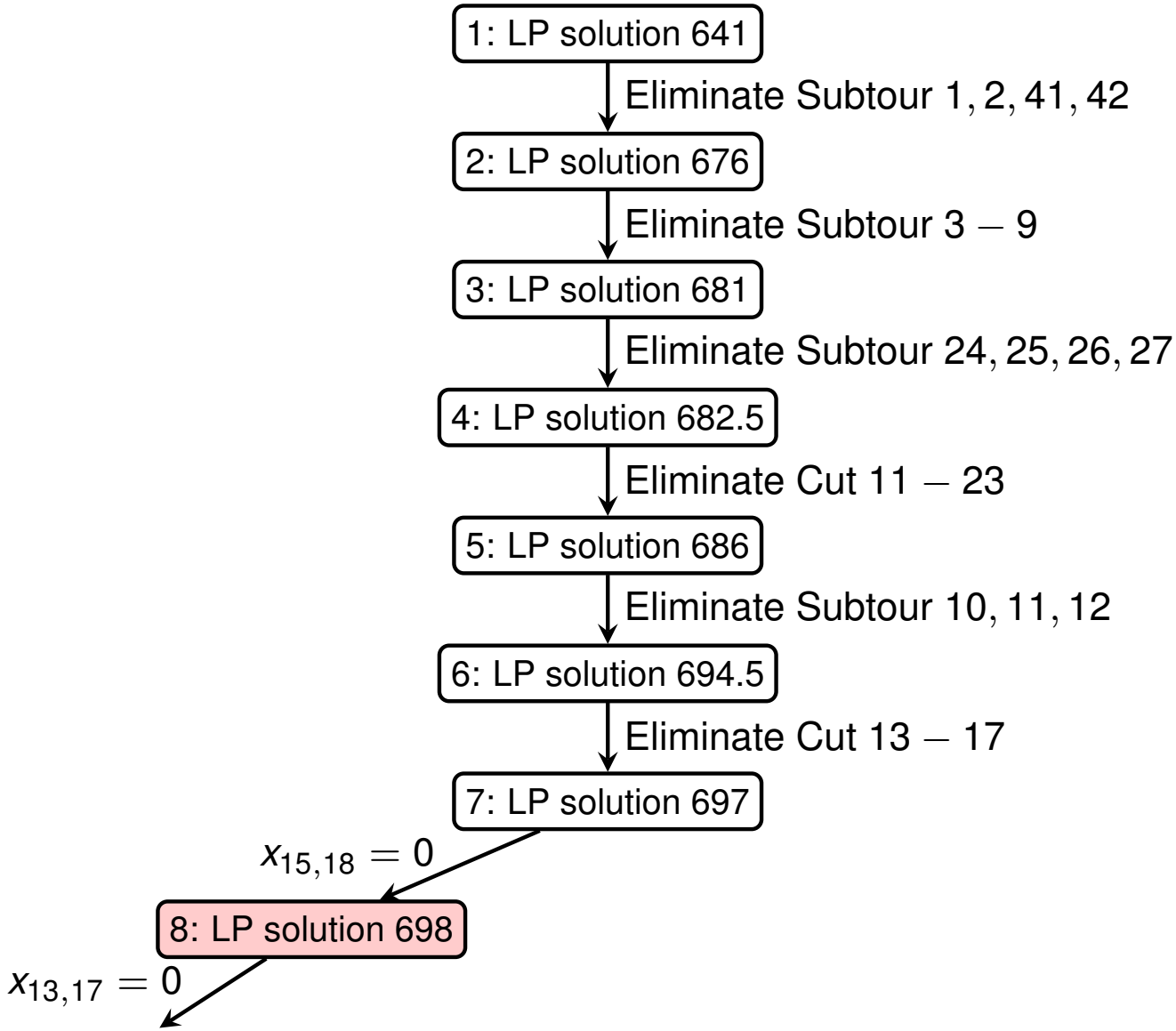

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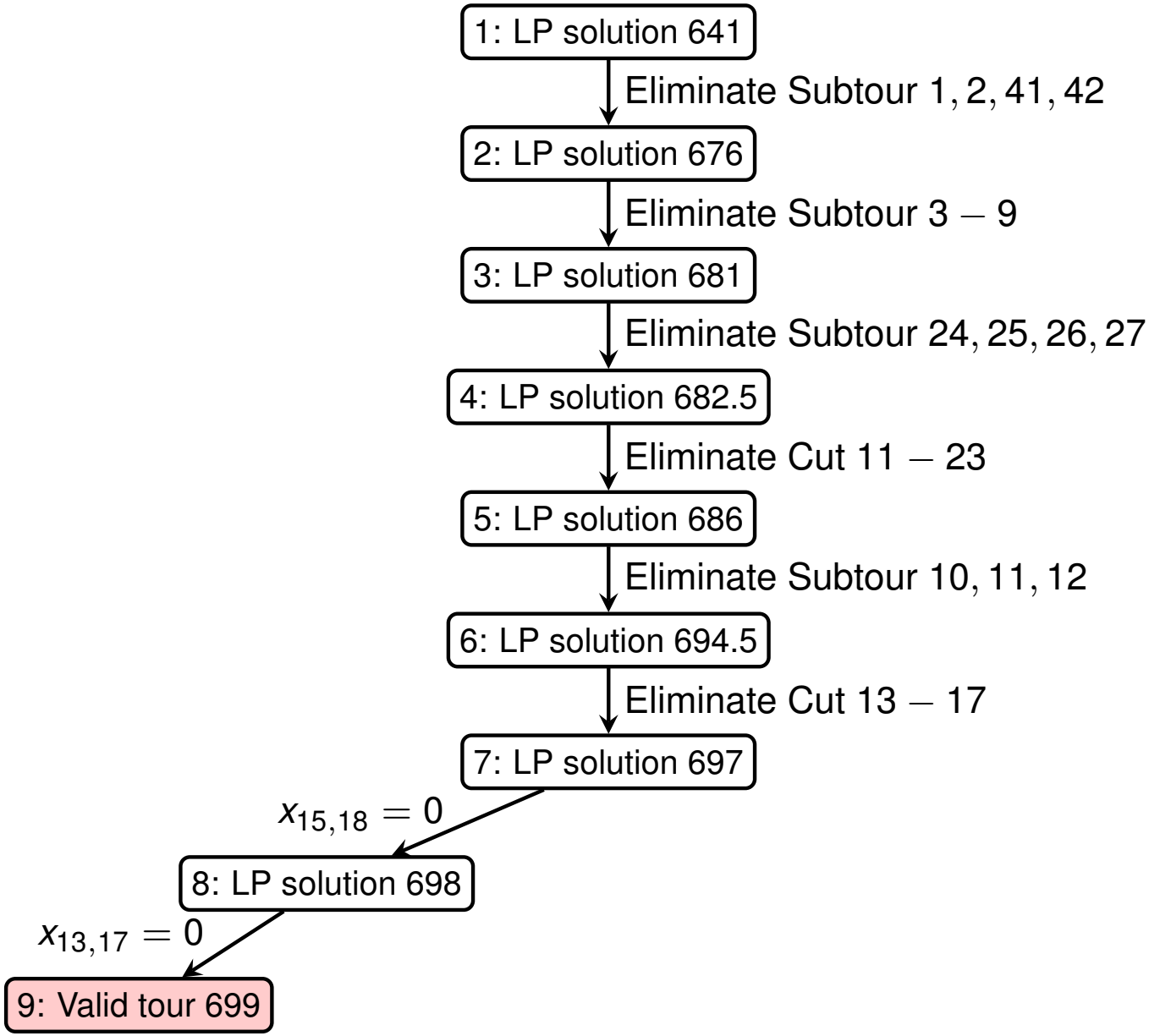

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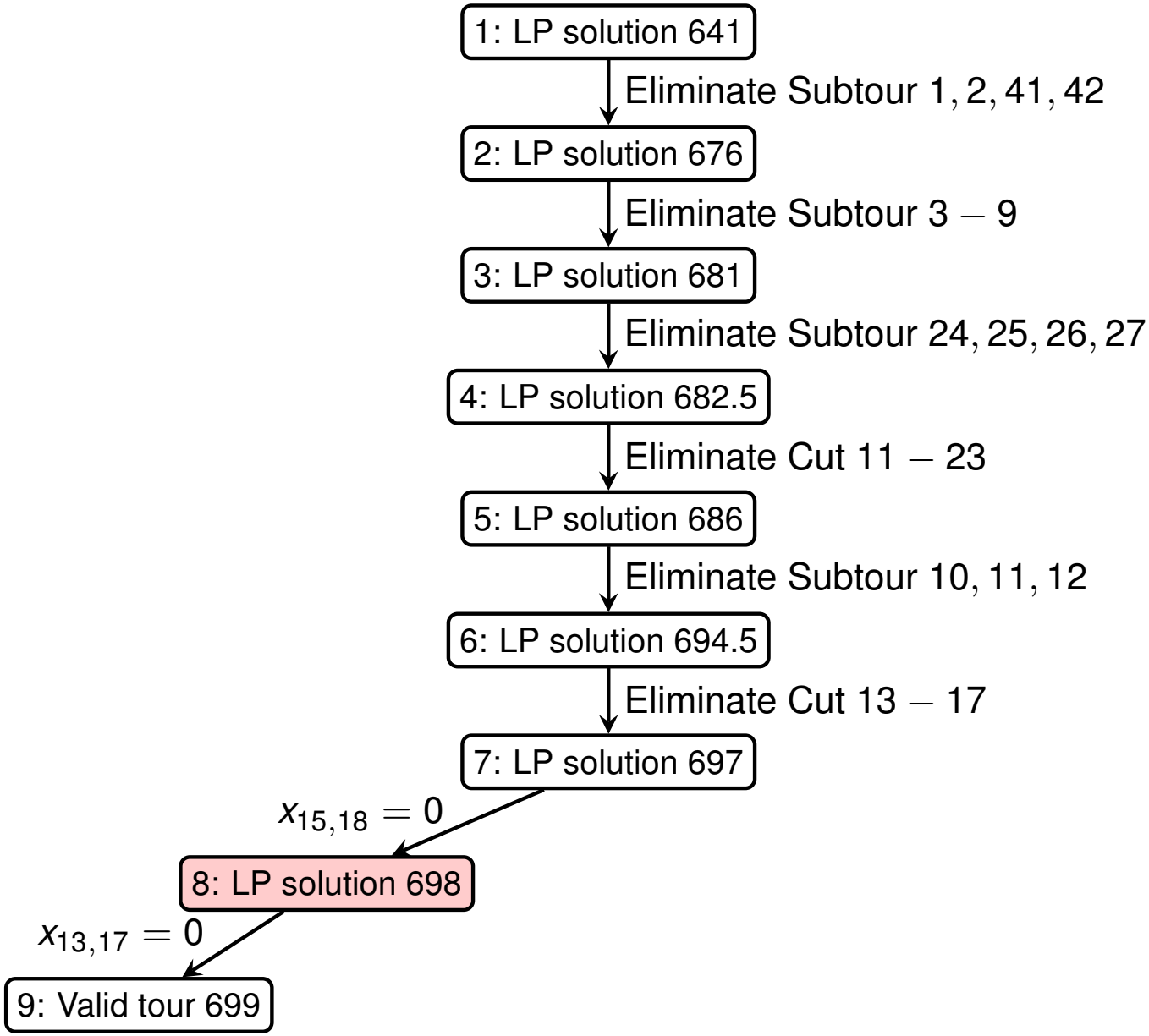

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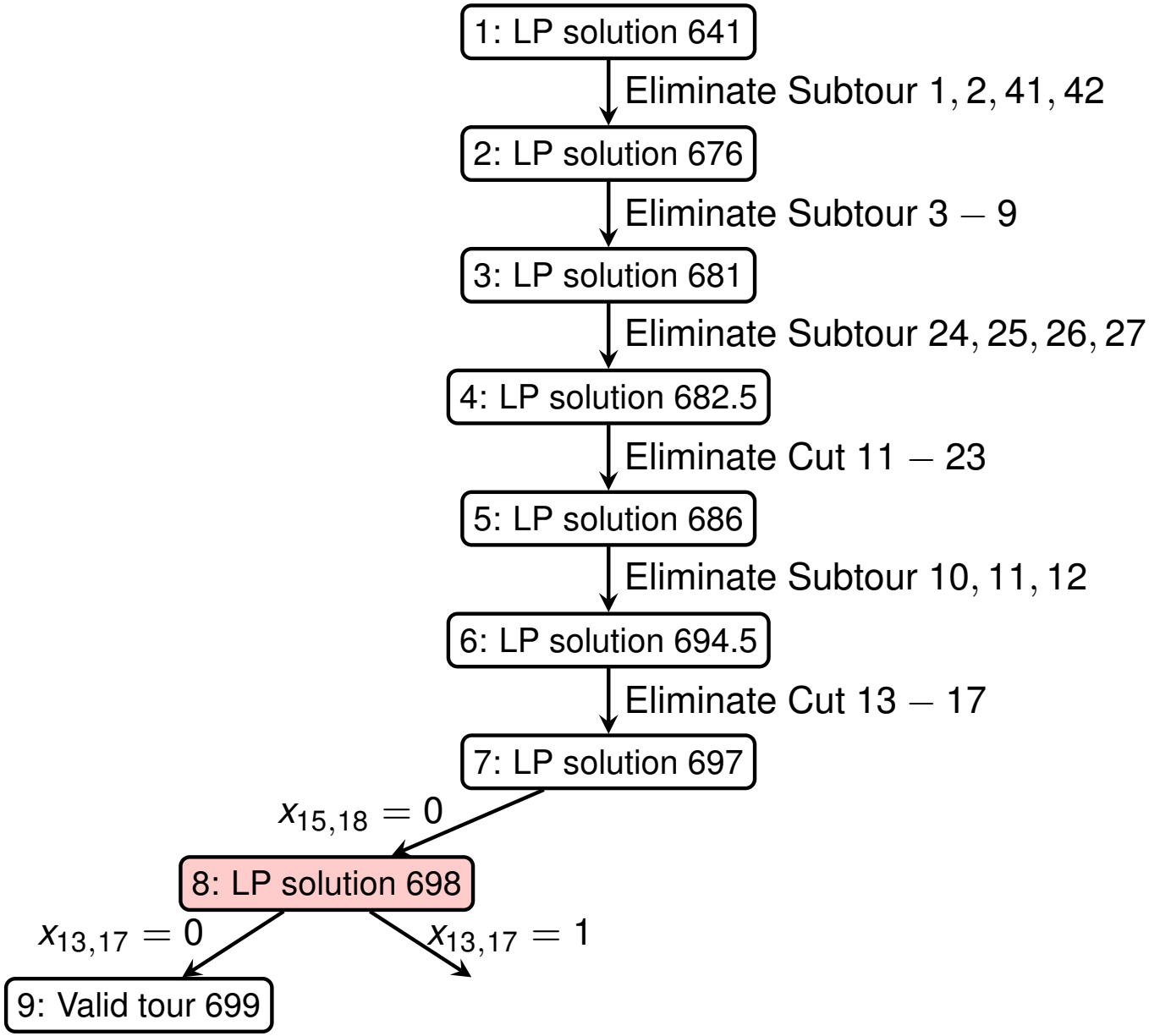

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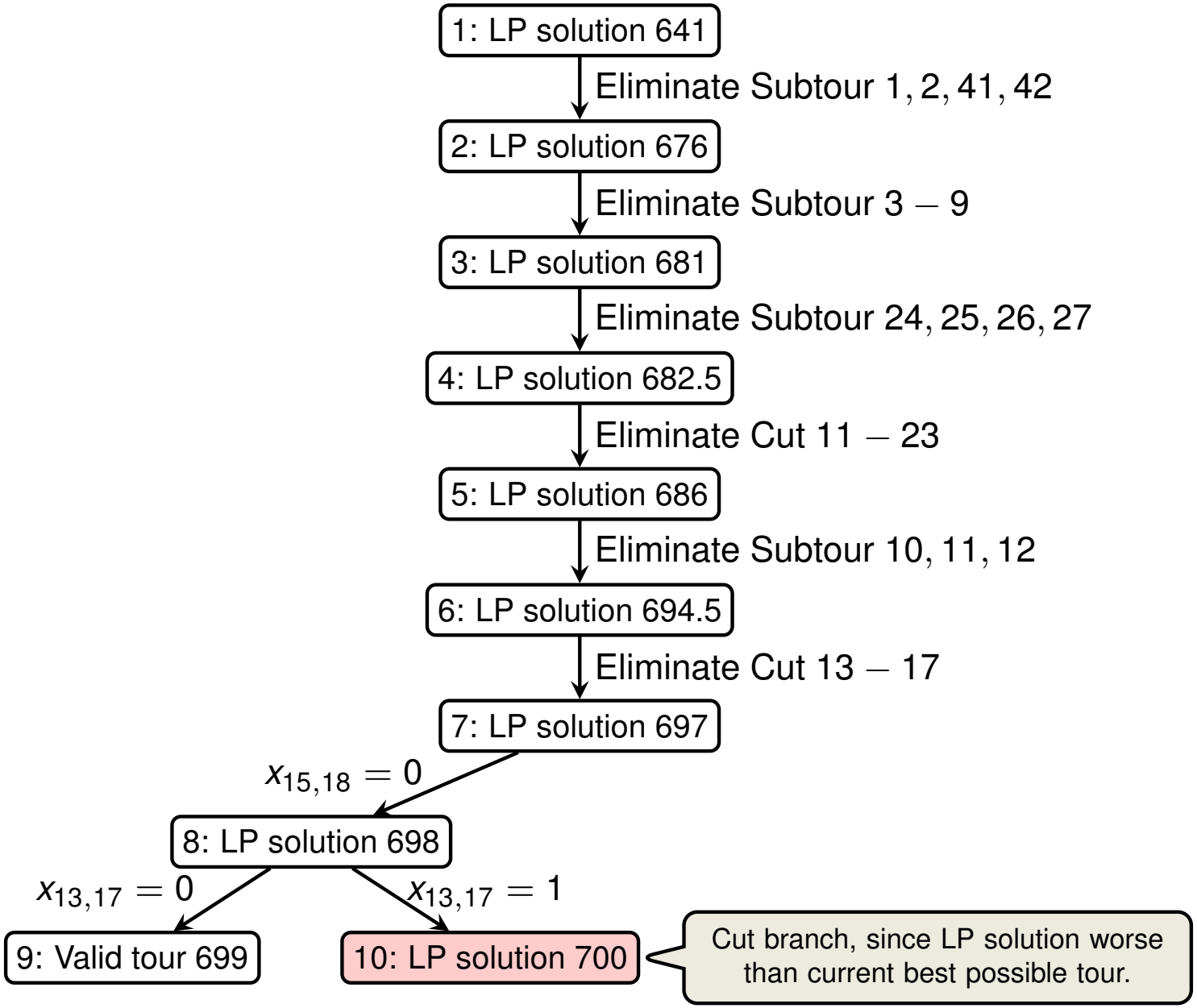

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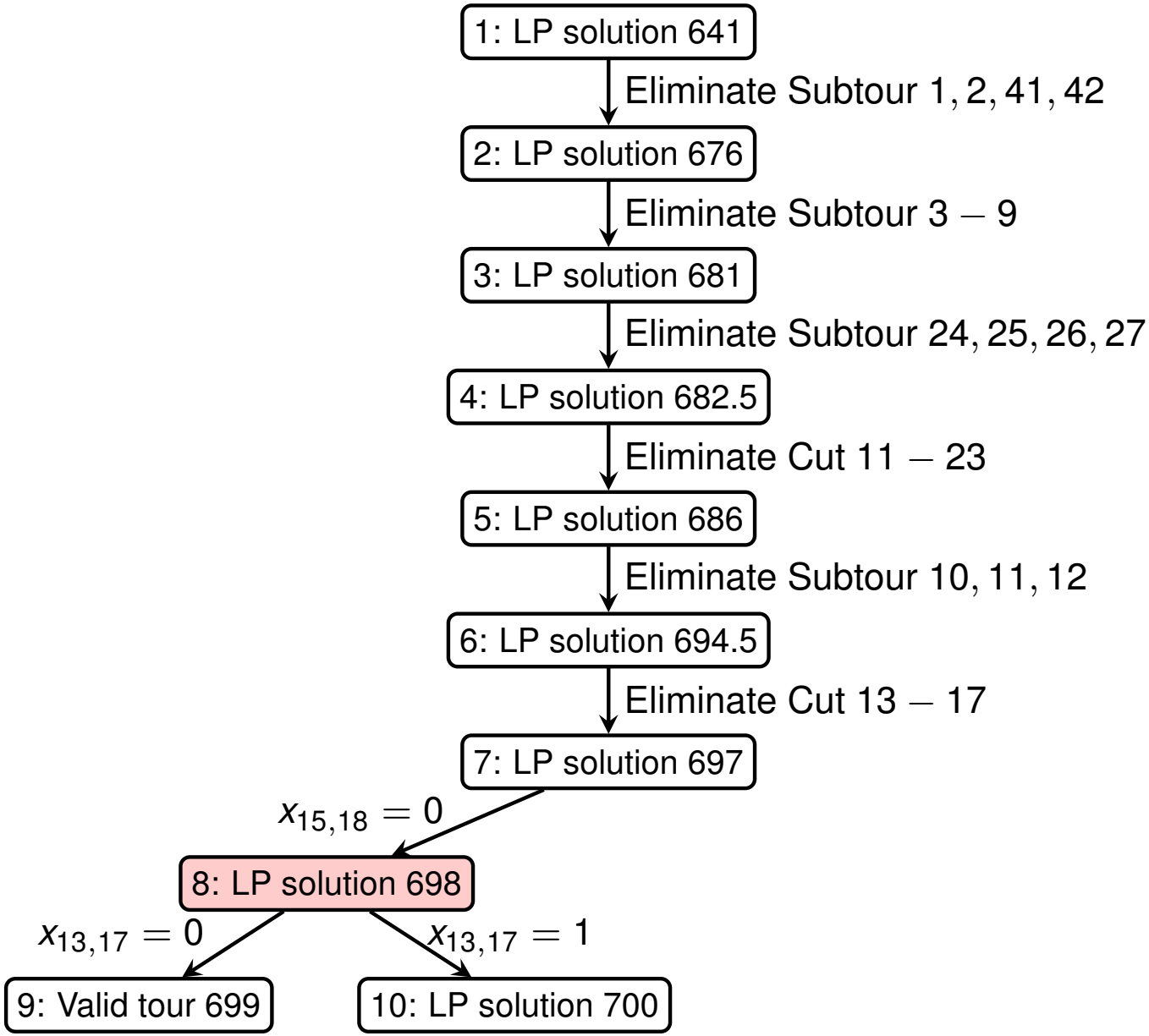

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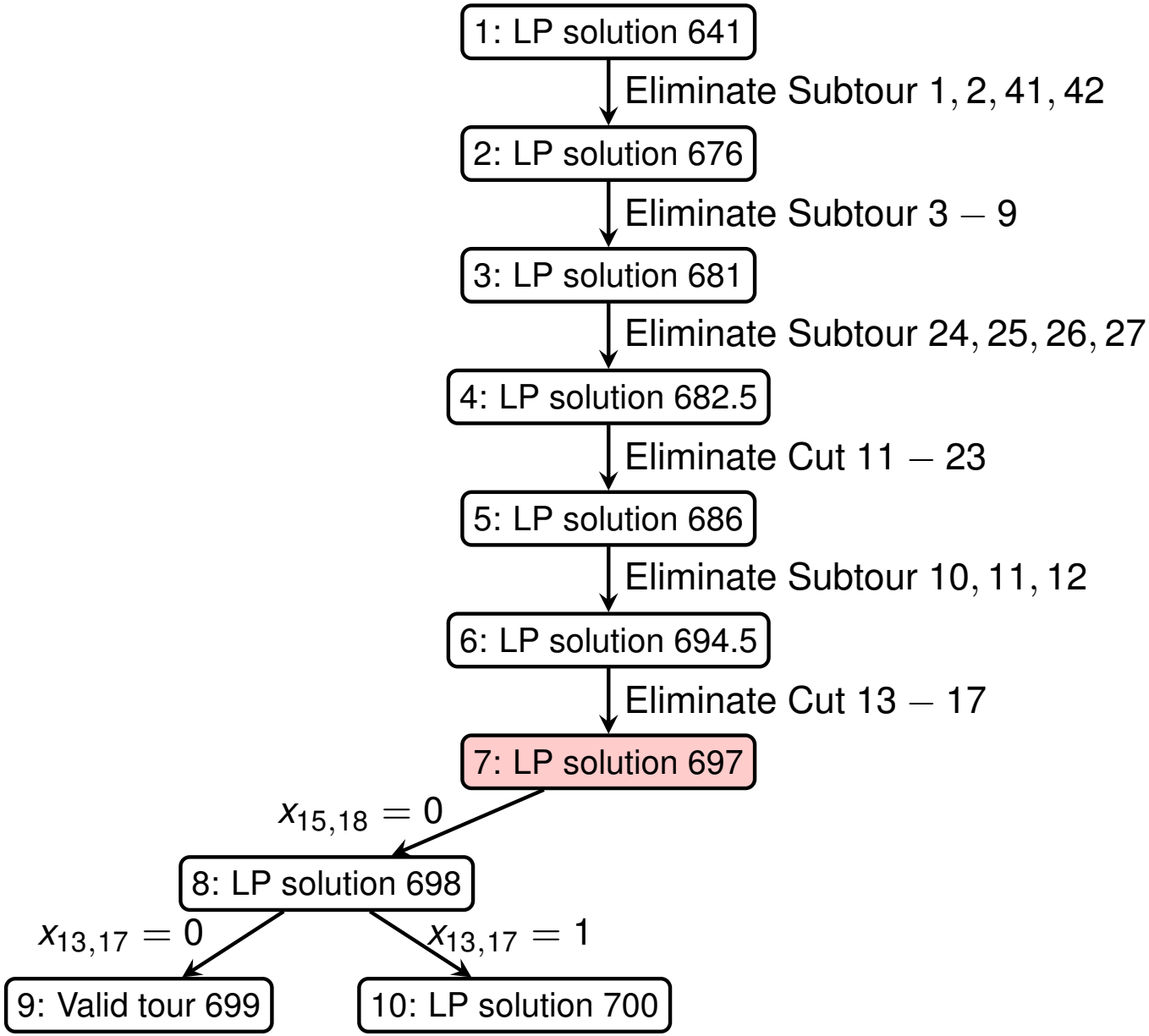

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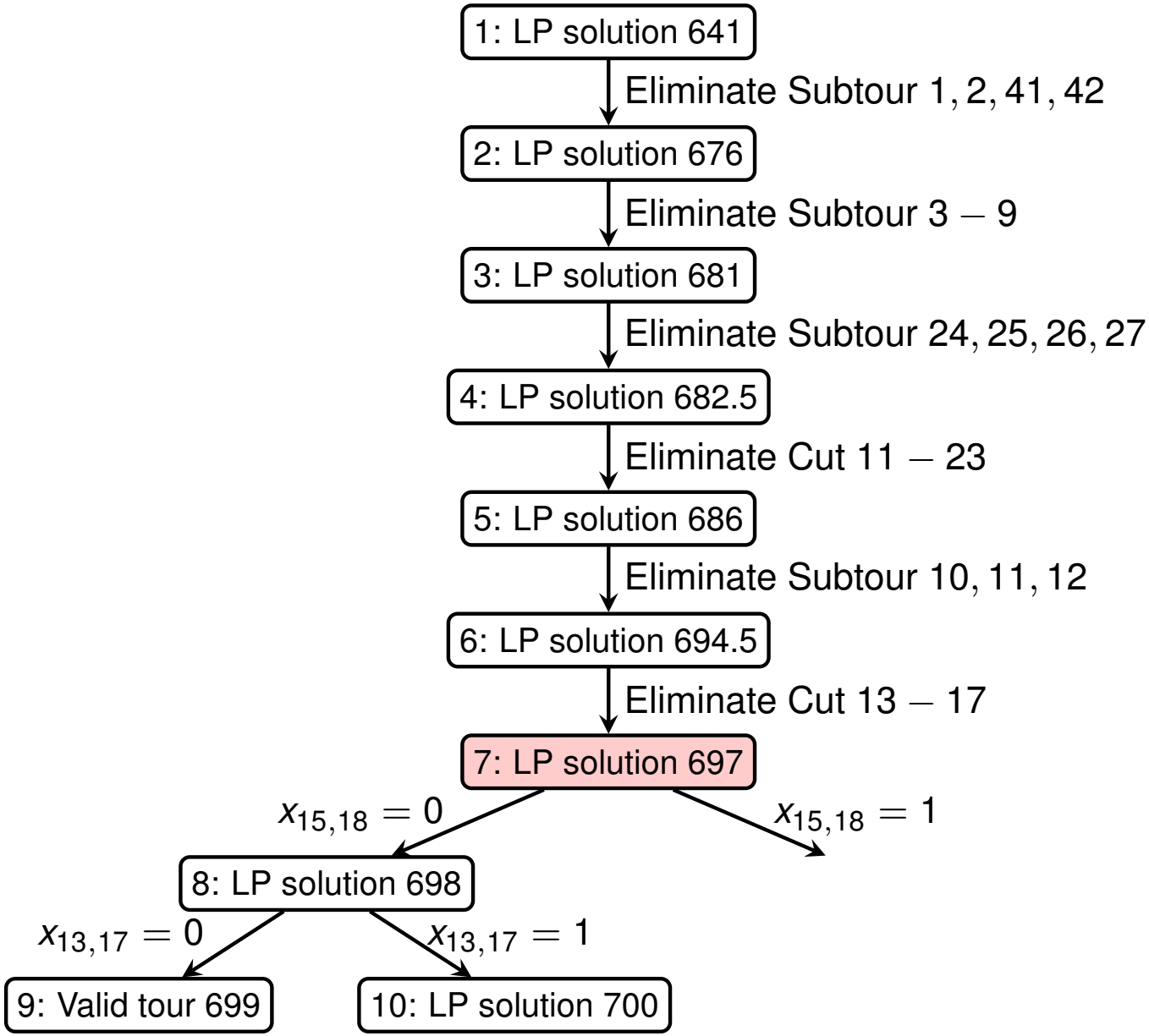
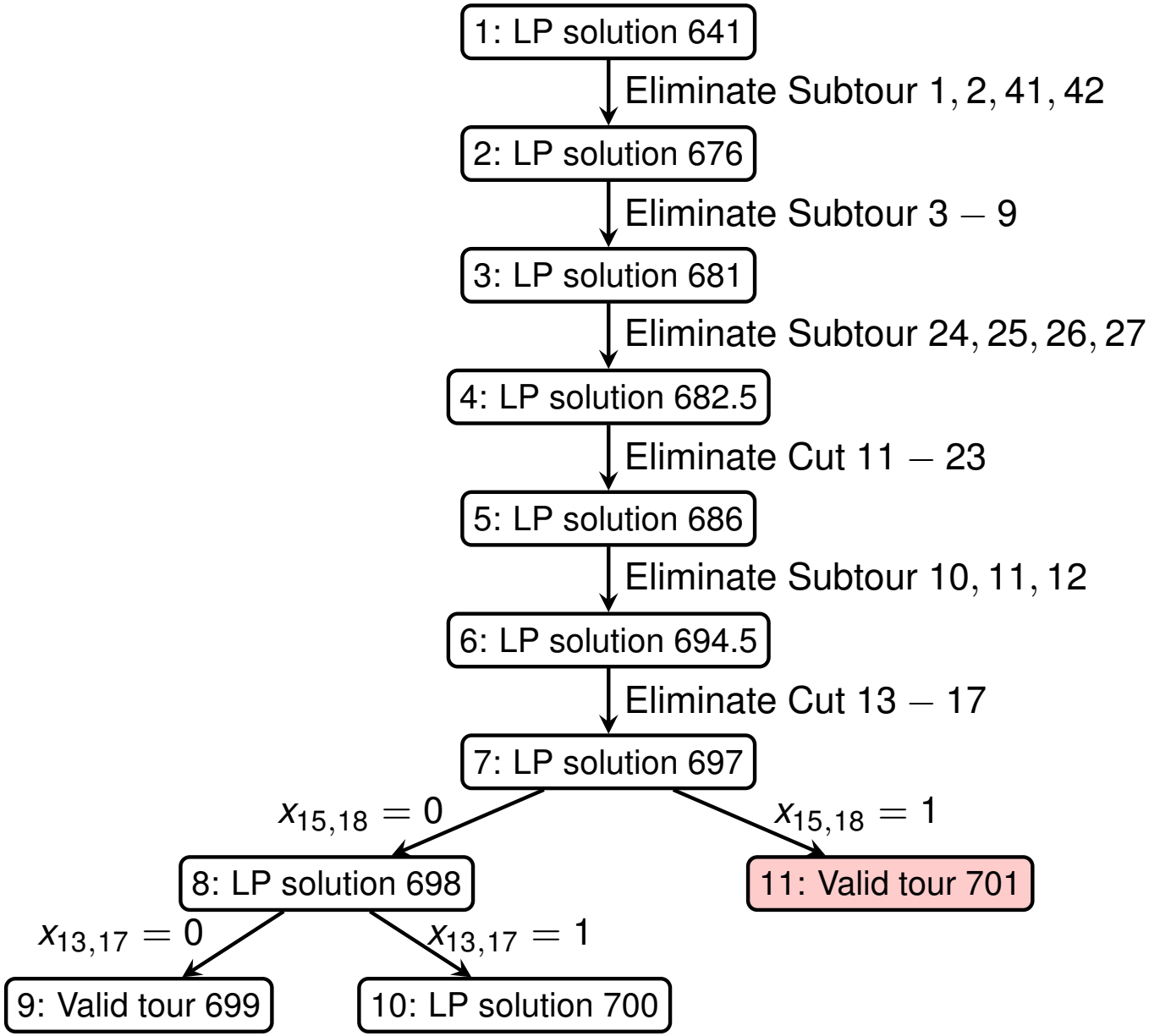
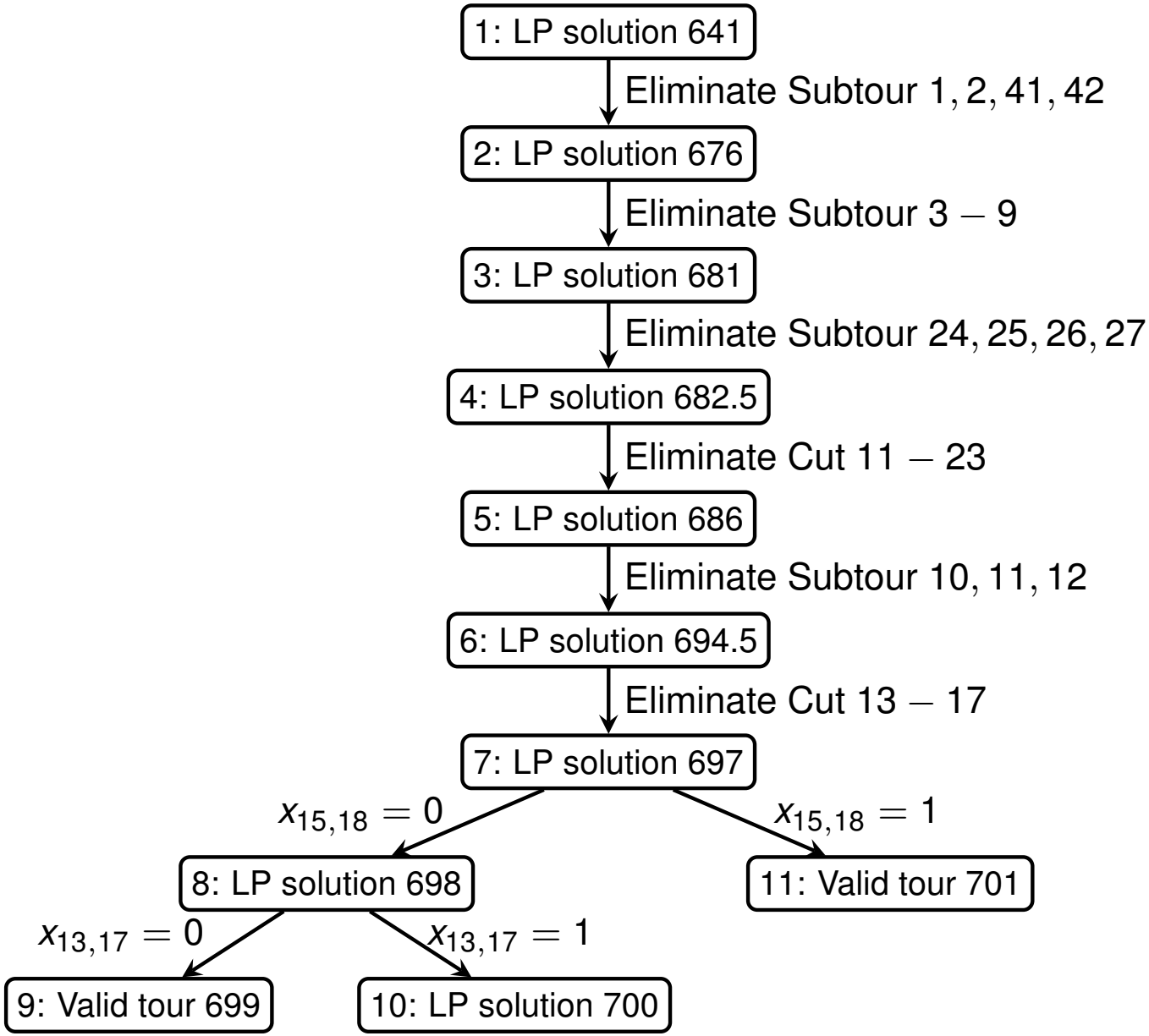


Branch & Bound Overview



Branch & Bound Overview