Lecture 14: Recursive Backtracking II

07/27/22

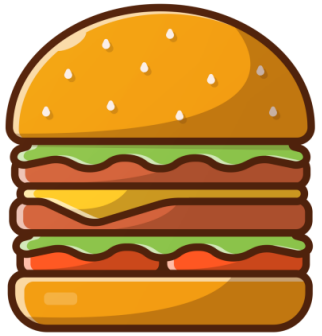
Reminders

- A3 Resubmission due Wednesday 7/27 @ 11:59pm
- A5 due Thursday 7/28 @ 11:59pm

Spend all your Husky card money!

Balance: $3

$1



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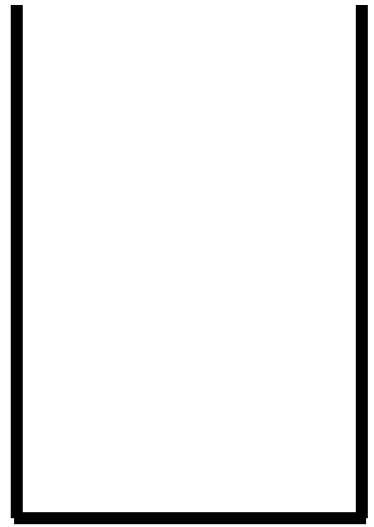

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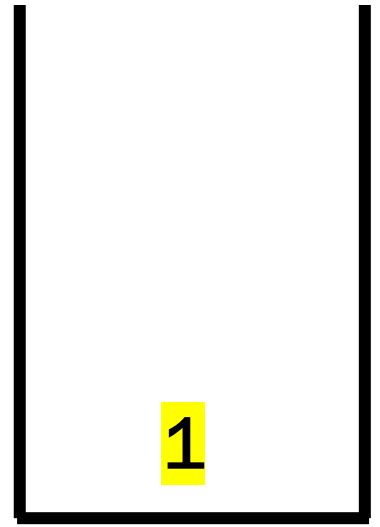

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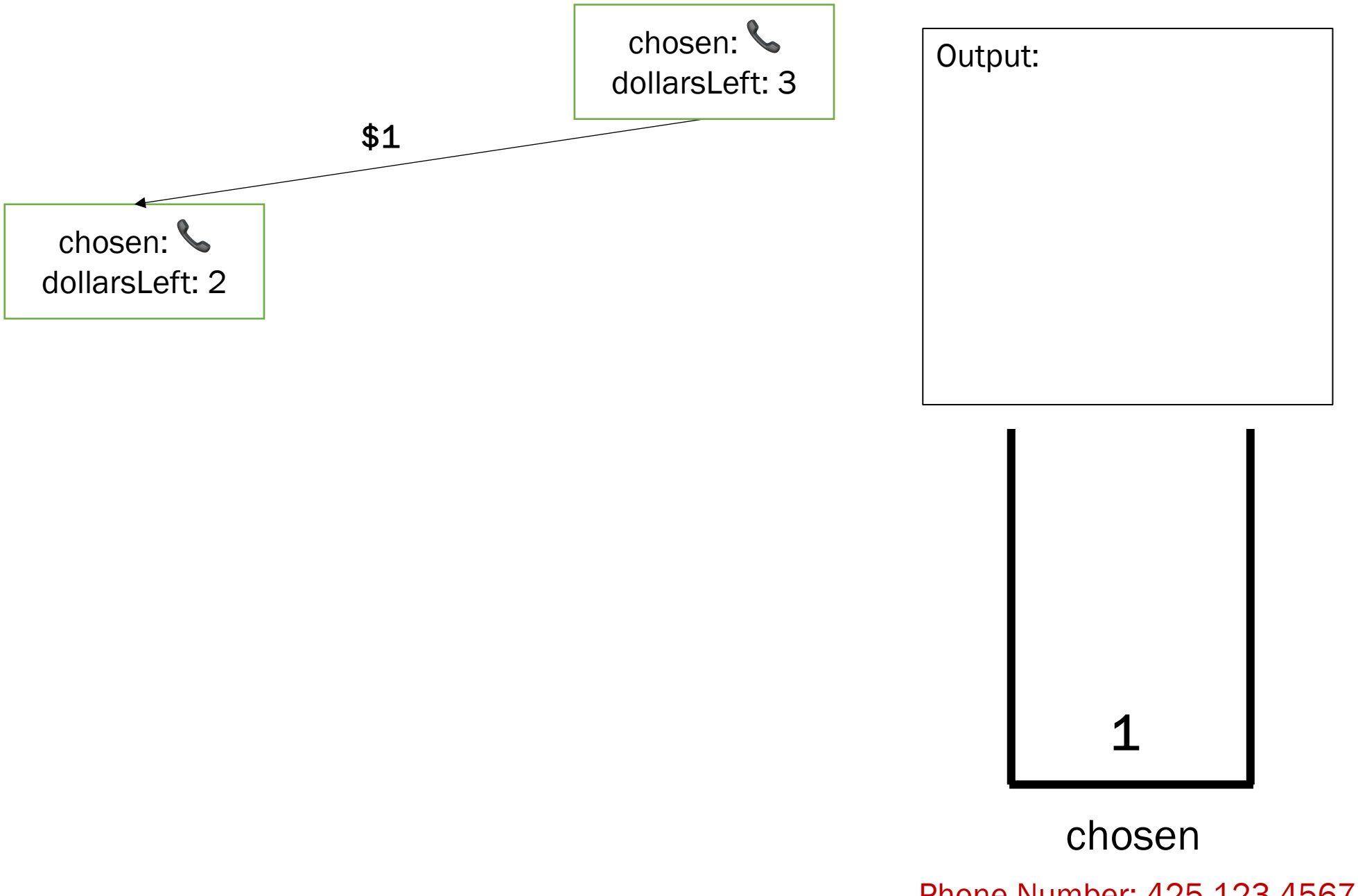
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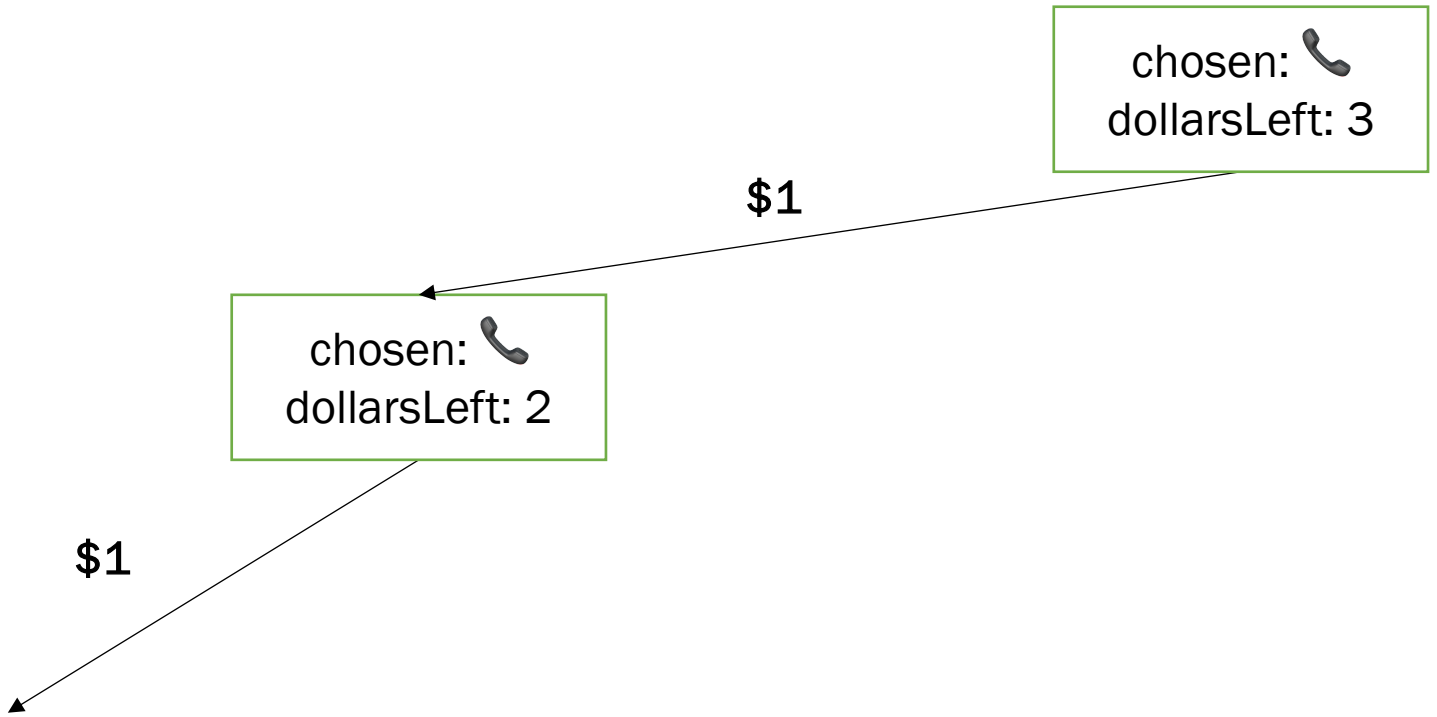

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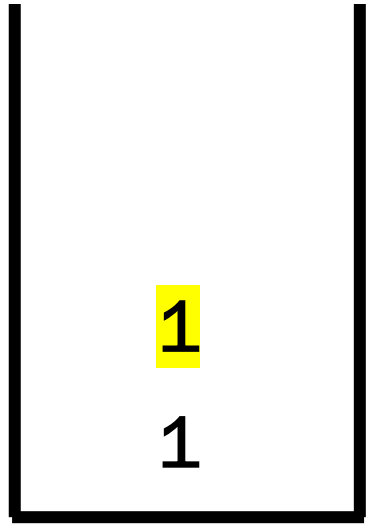

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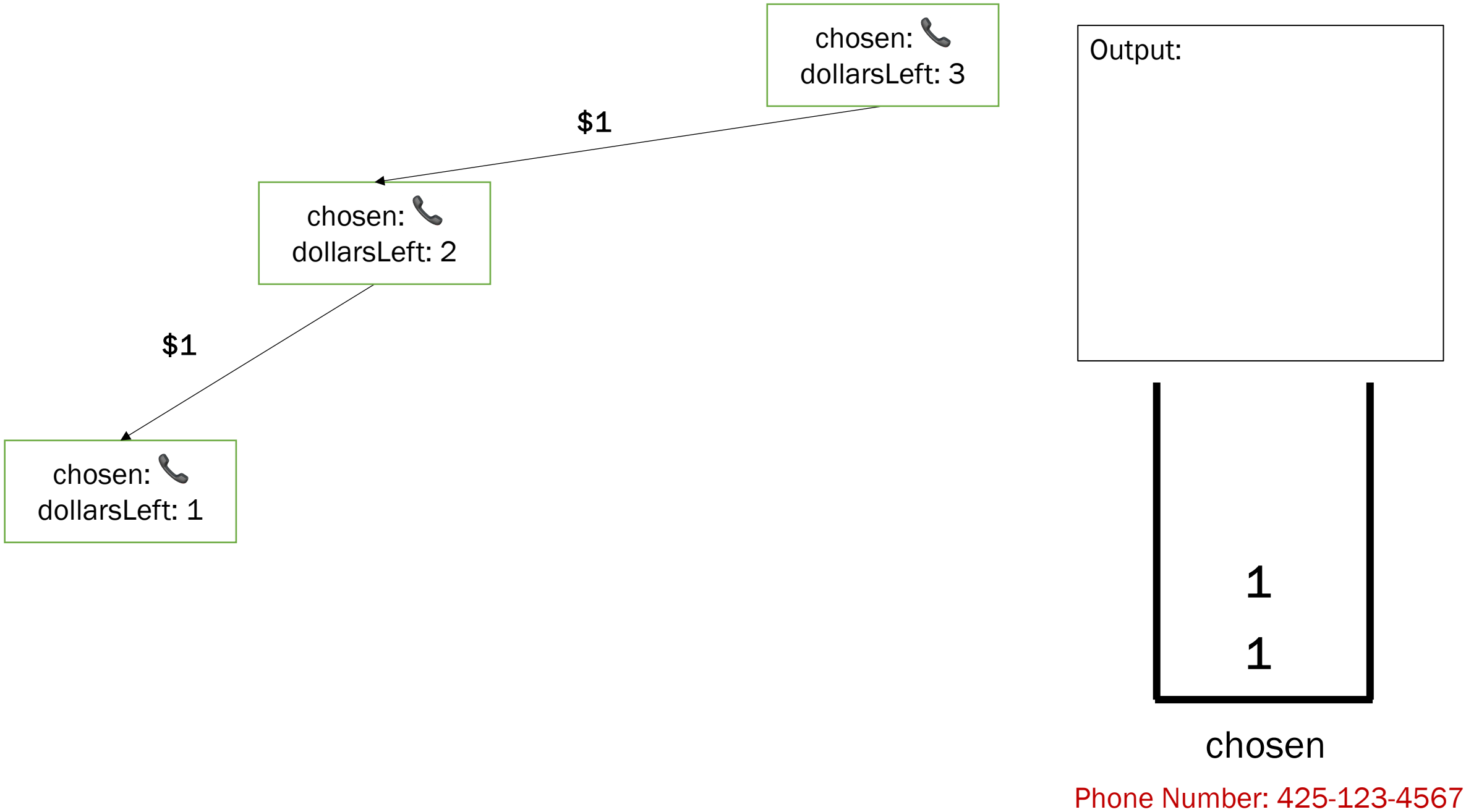
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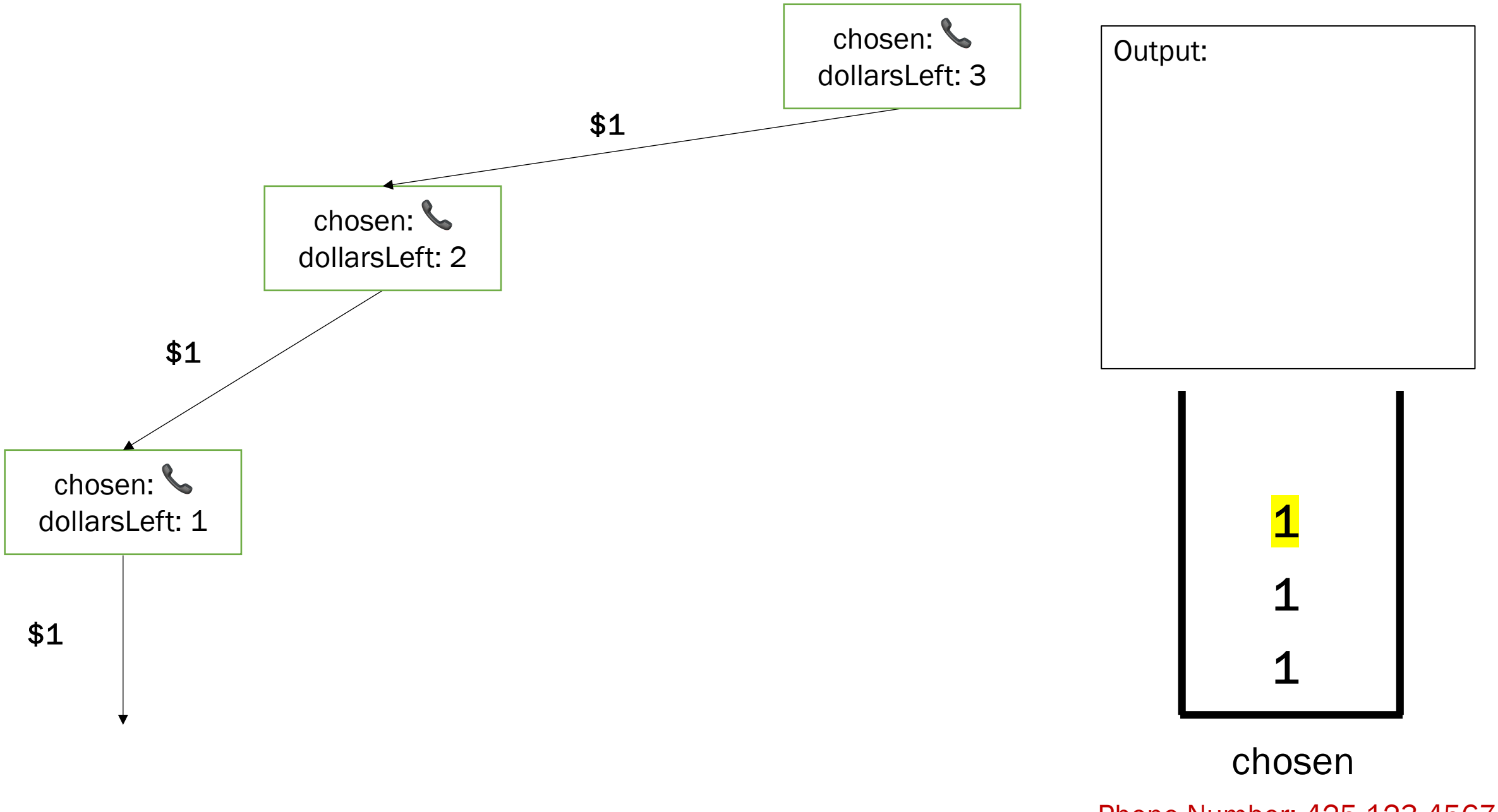

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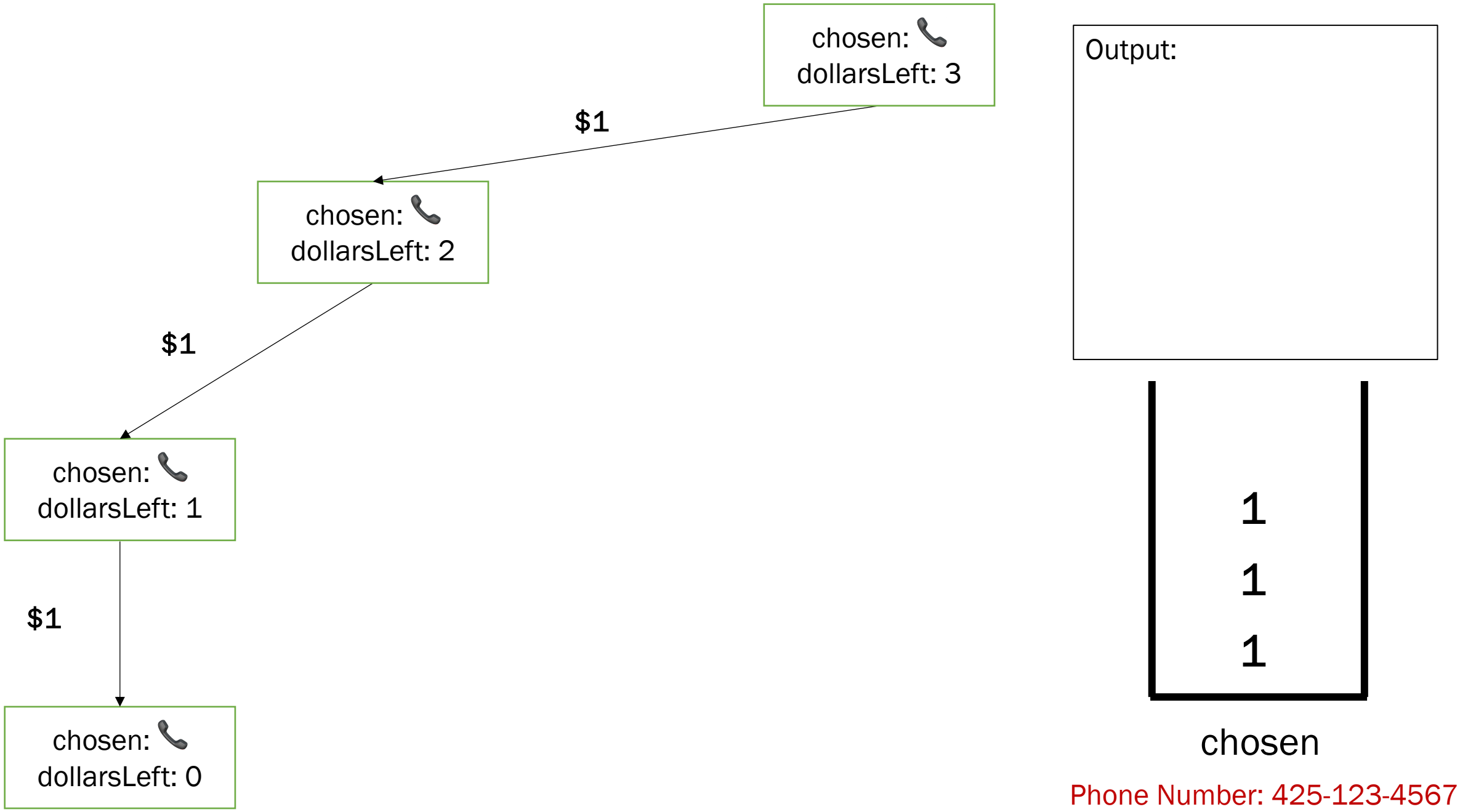
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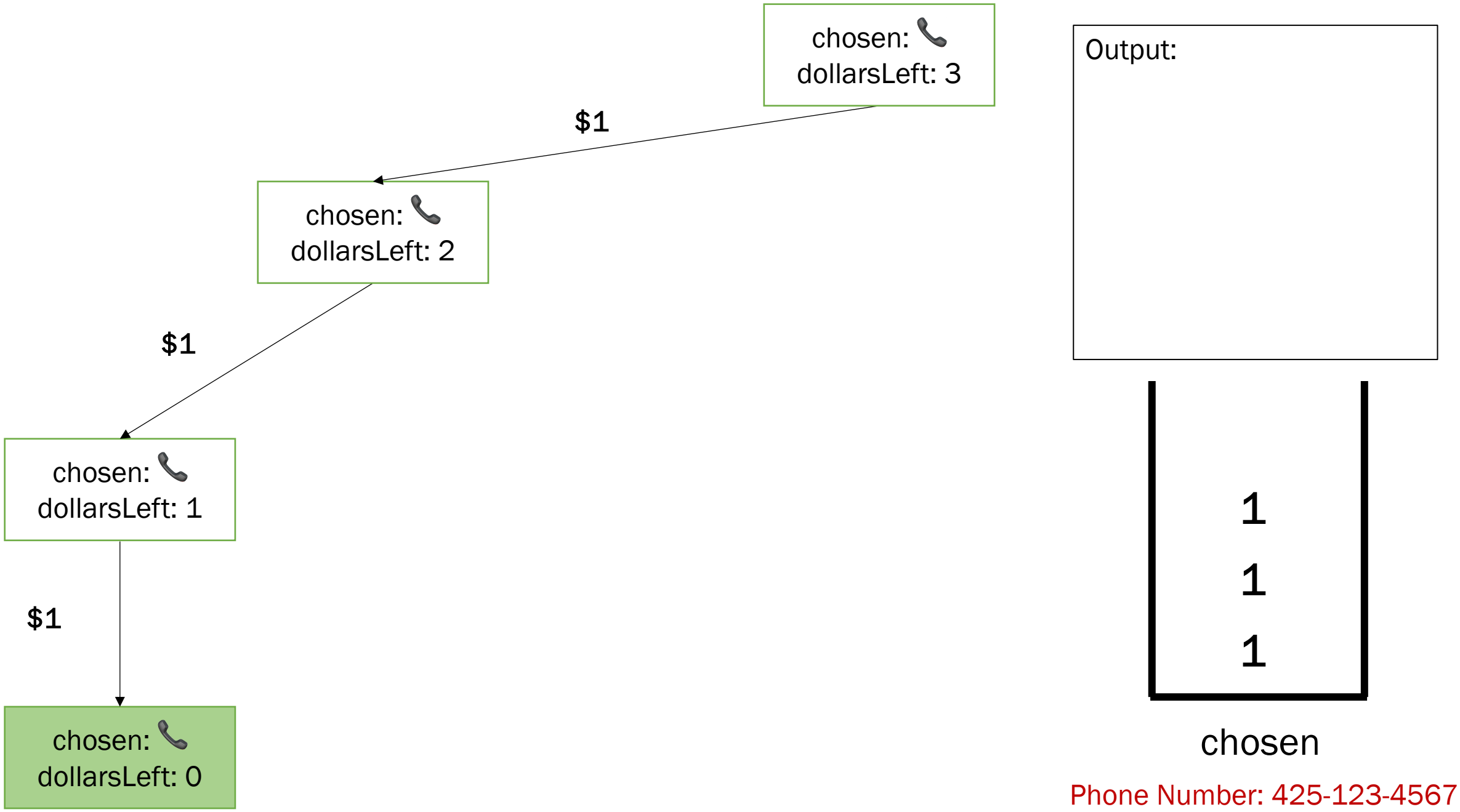
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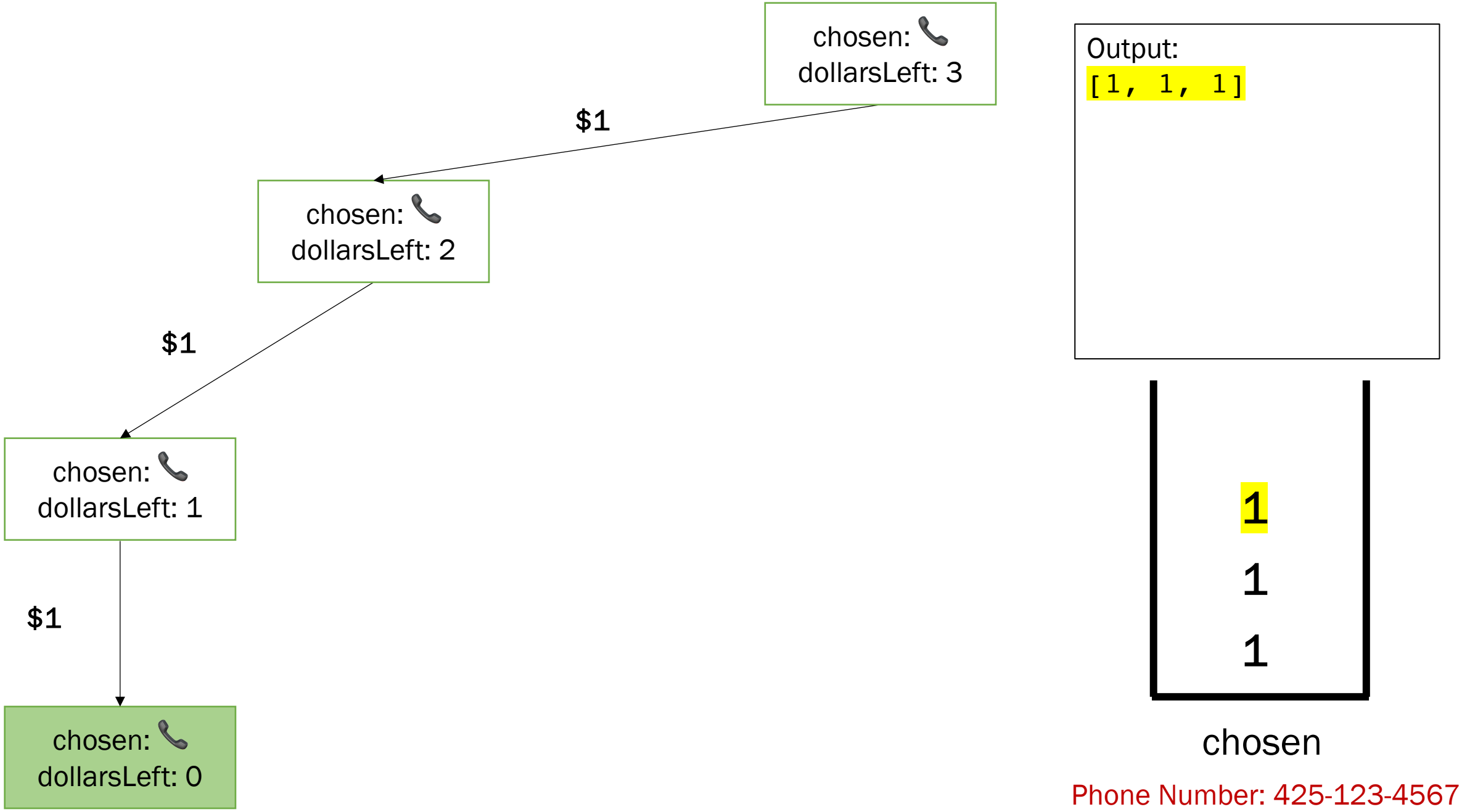
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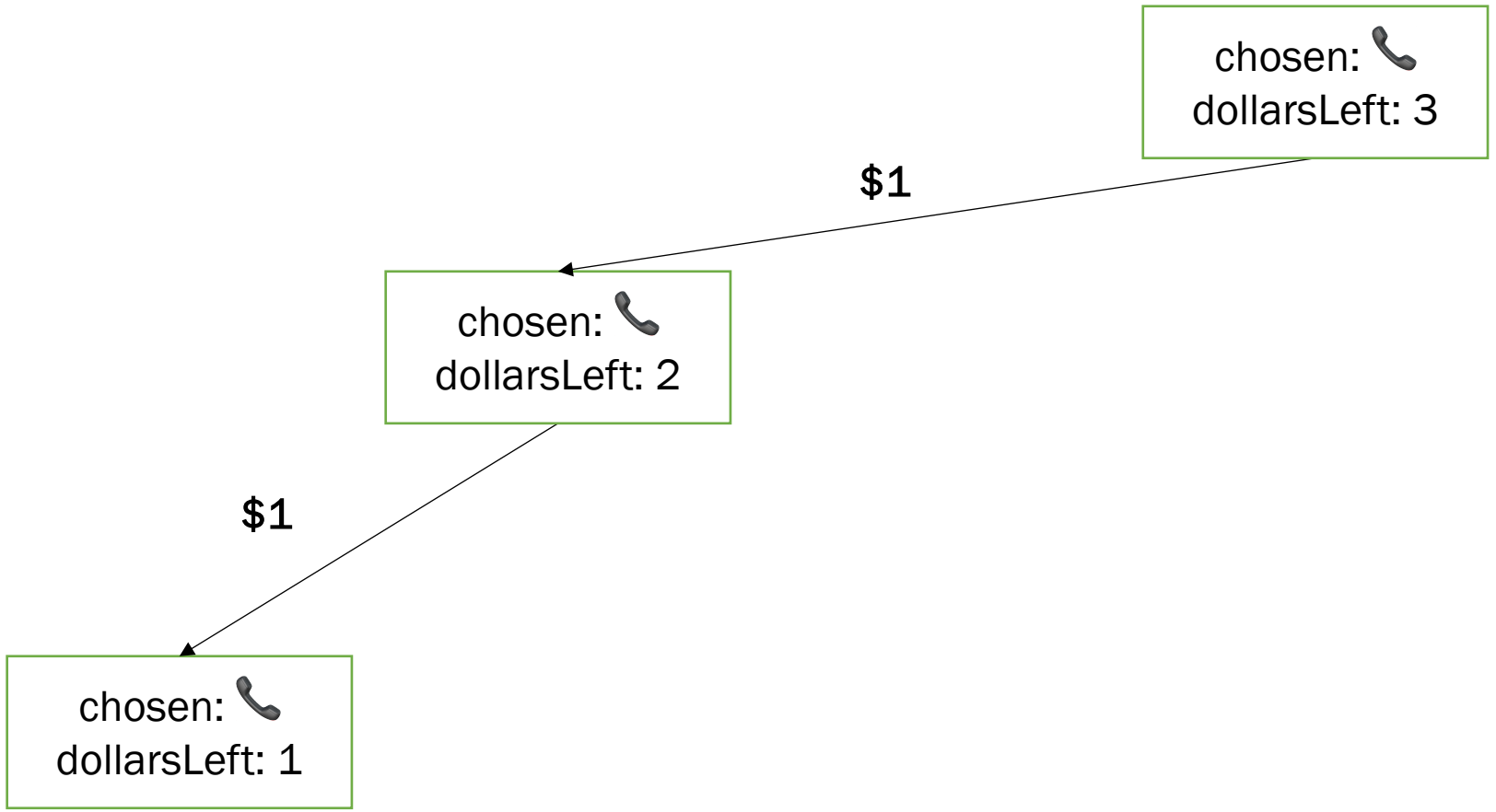

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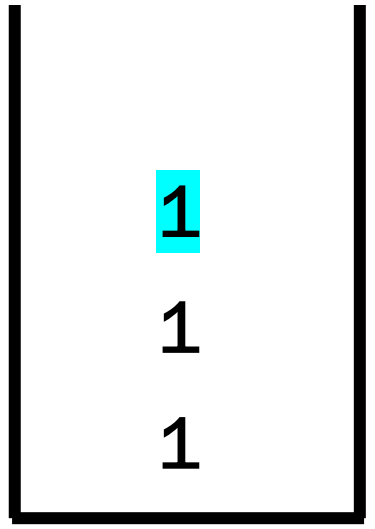

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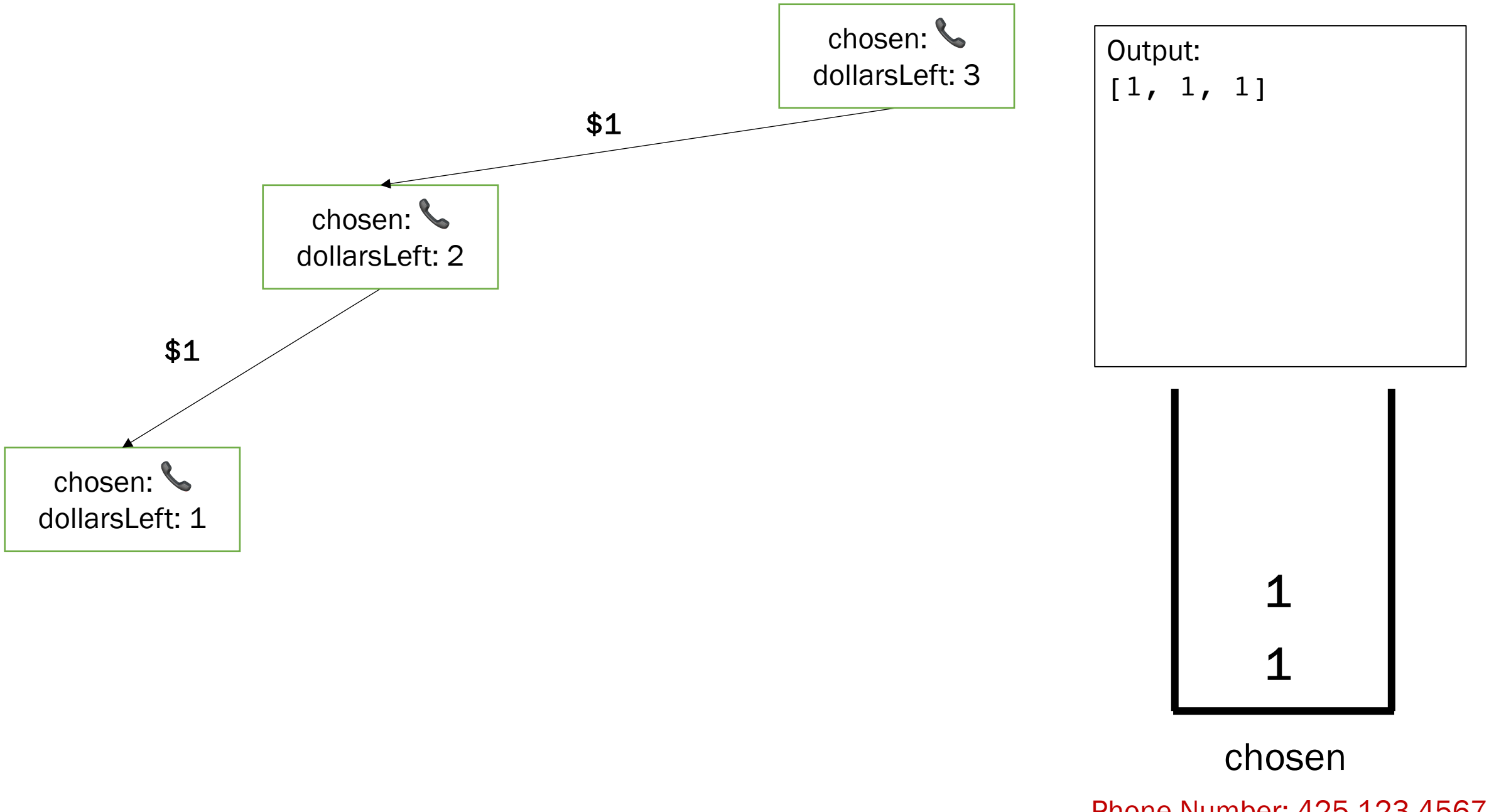
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1
chosen
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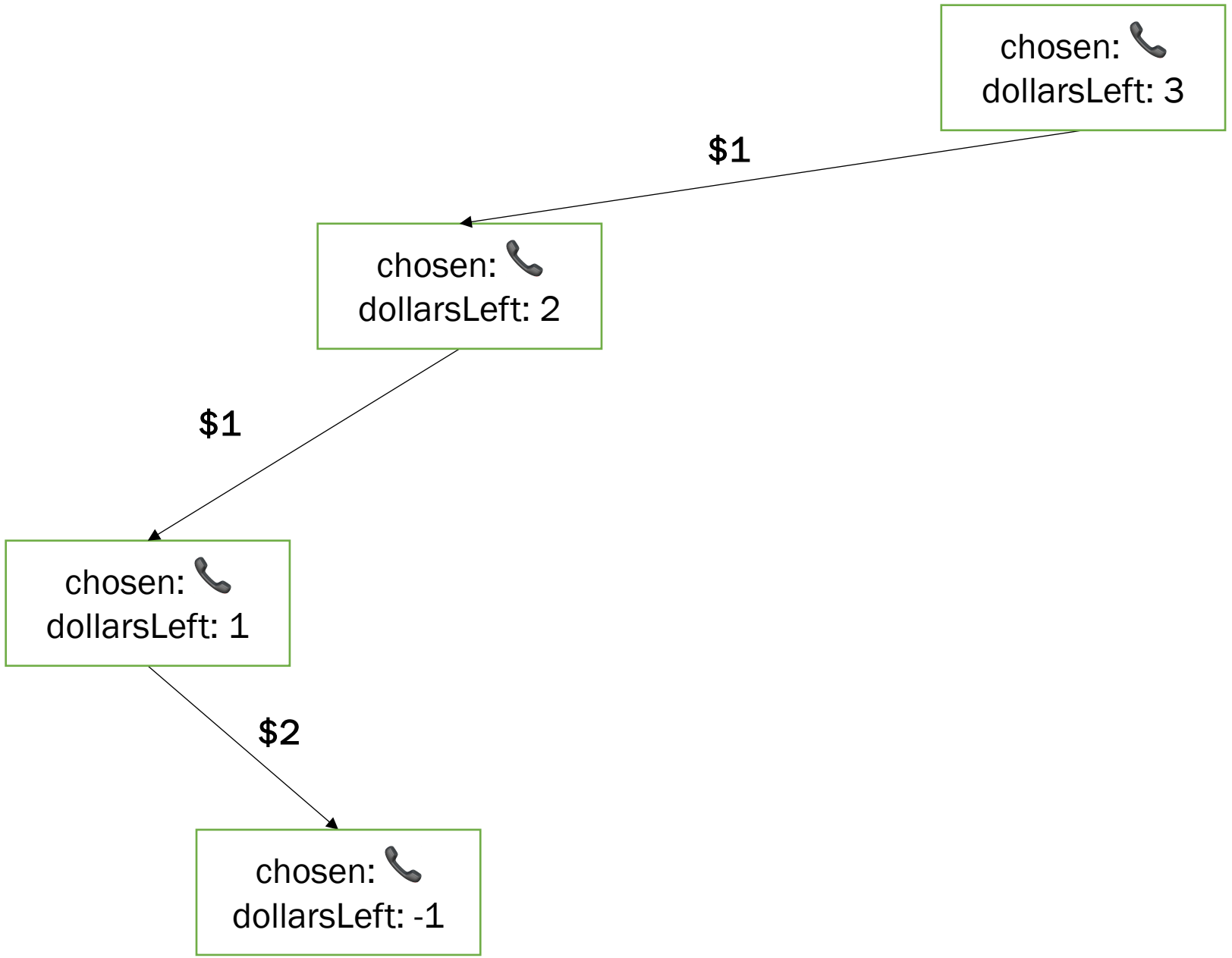

Output:

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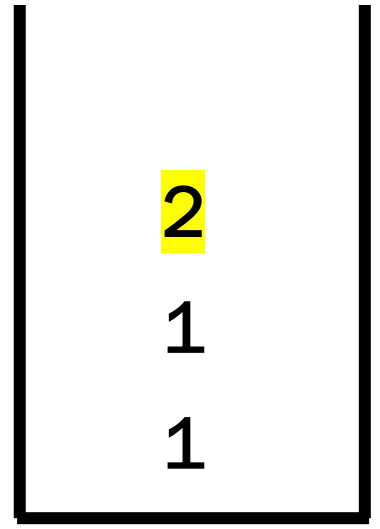

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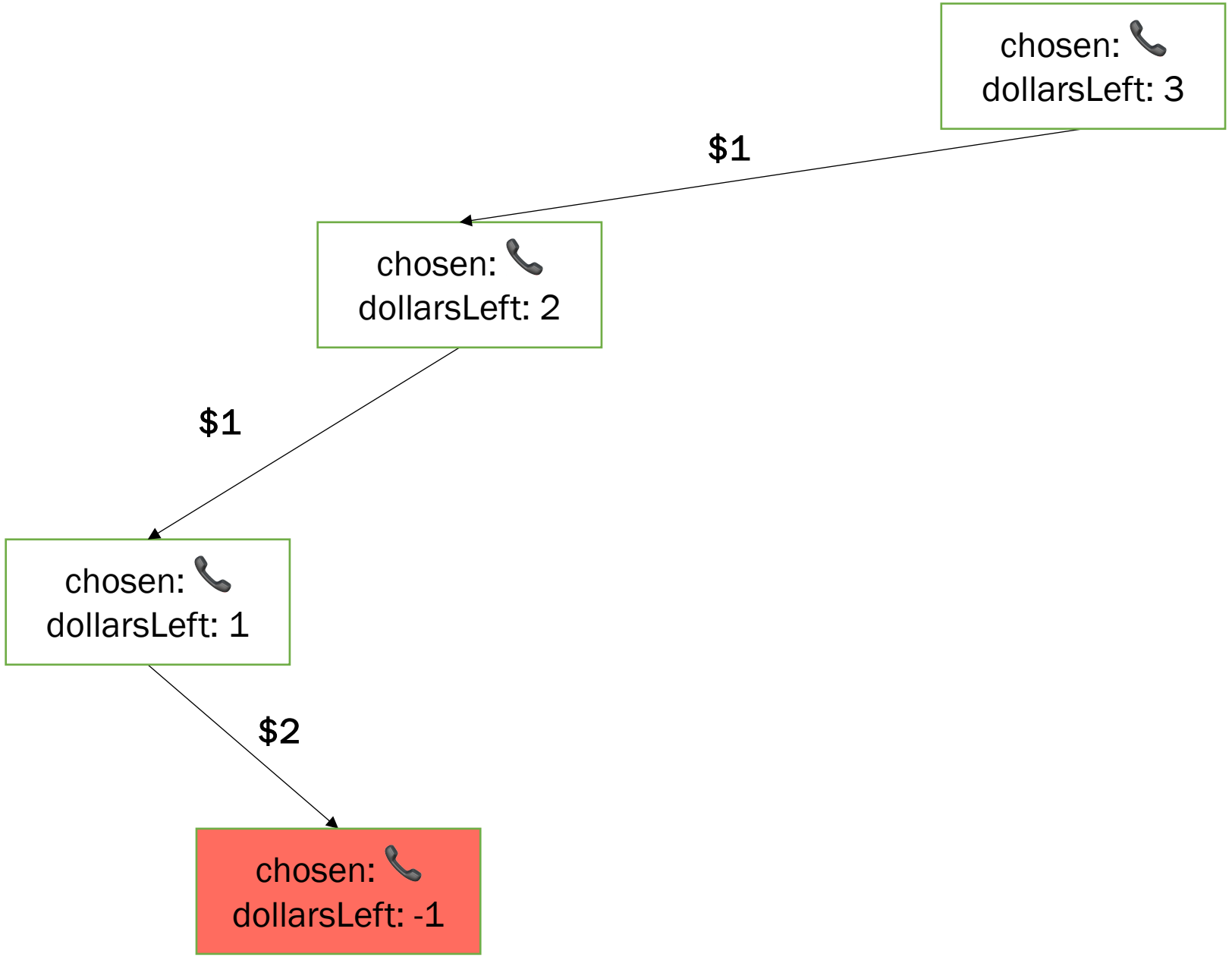
Phone Number: 425-123-4567



Output:

```
[1, 1, 1]
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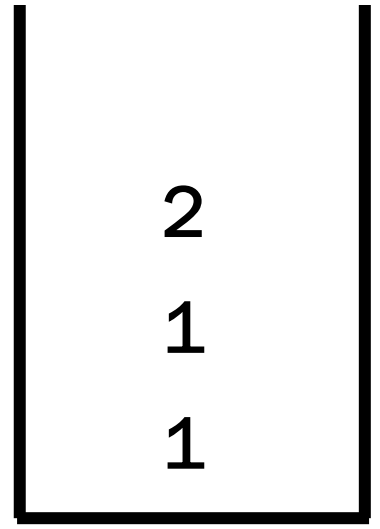

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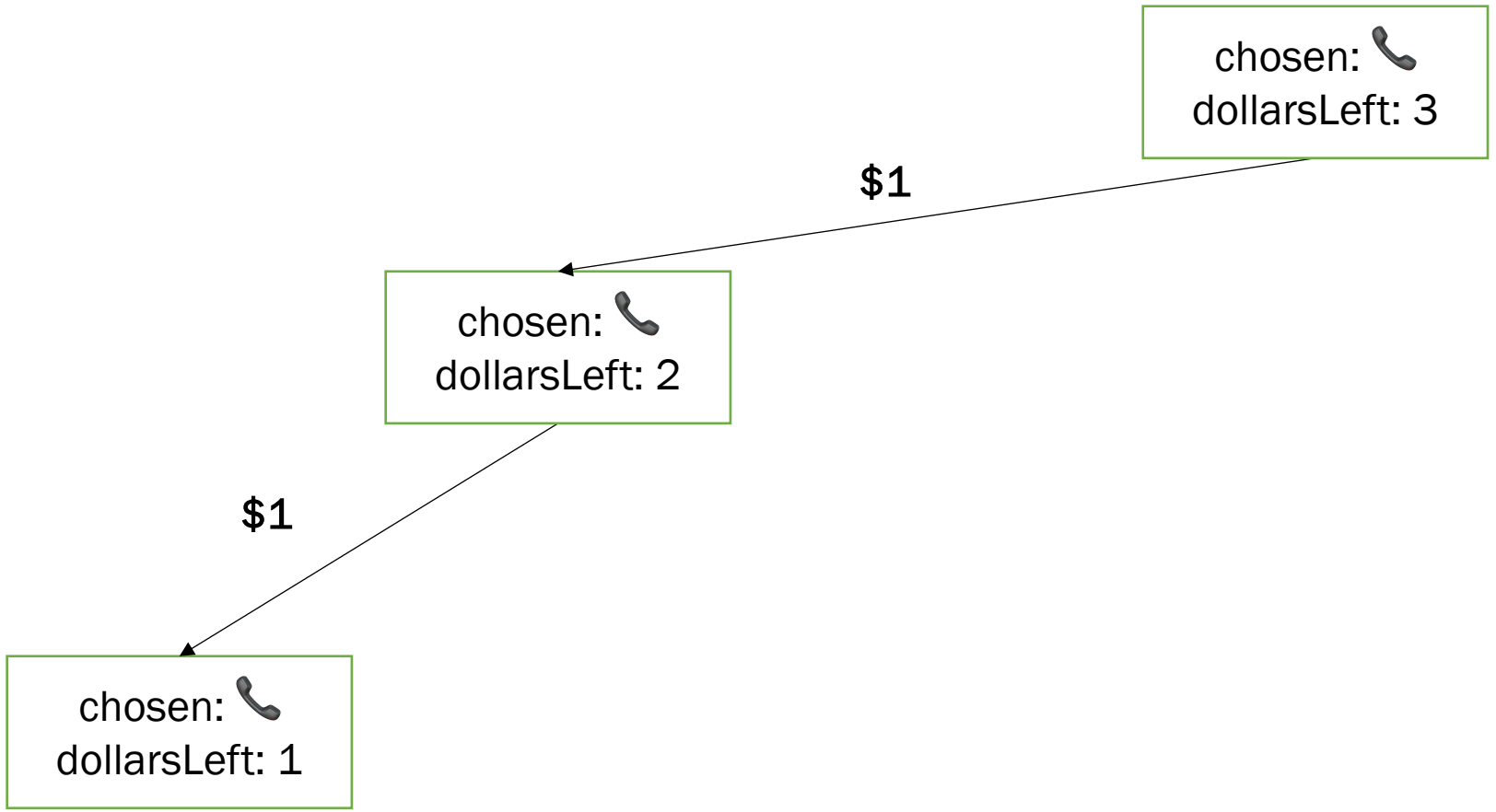

Output:

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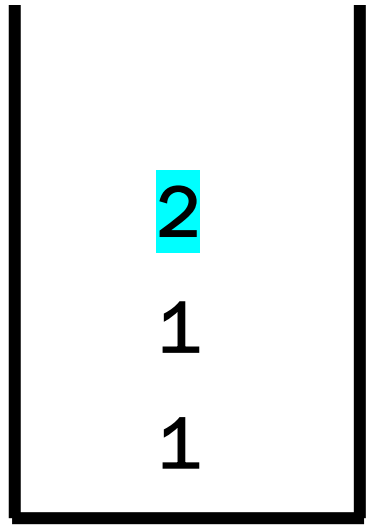

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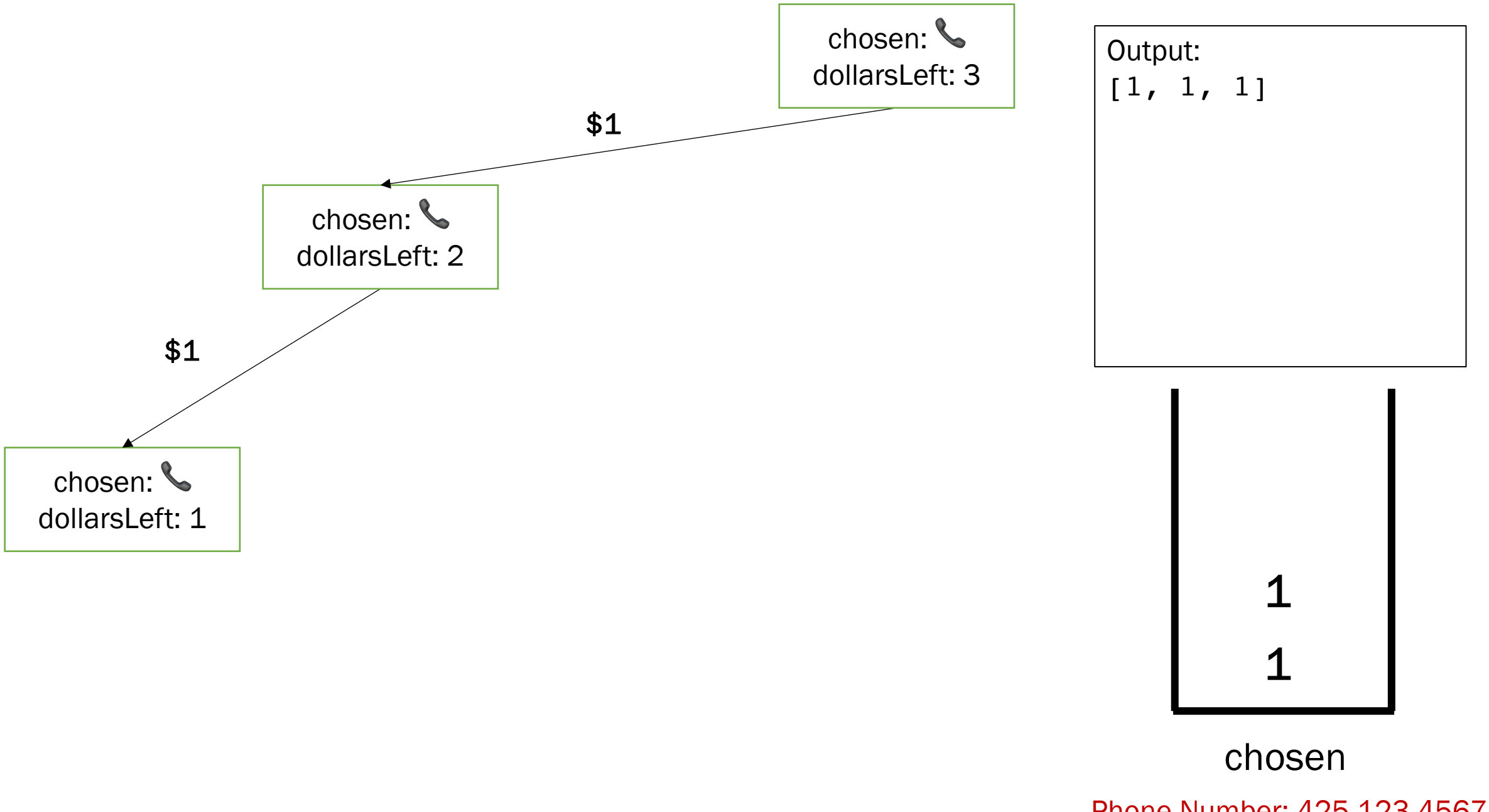
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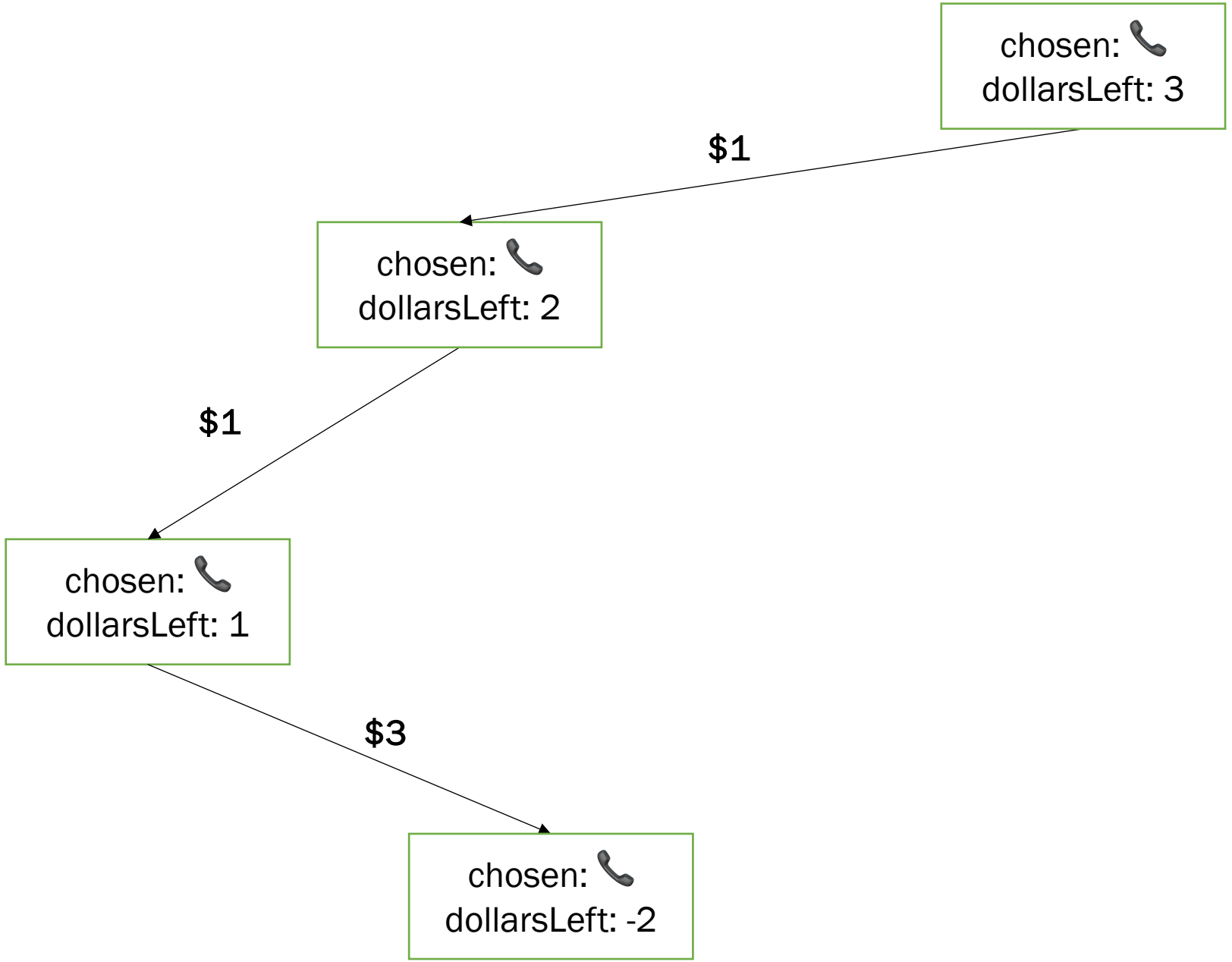
1
chosen
Phone Number: 425-123-4567



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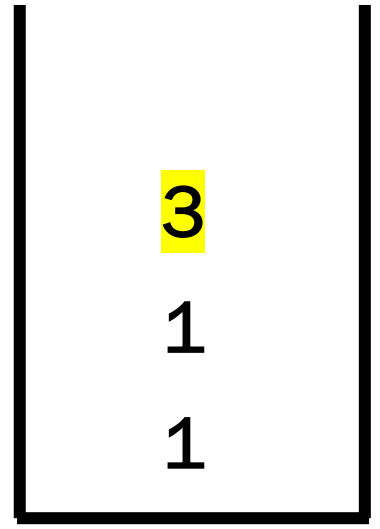

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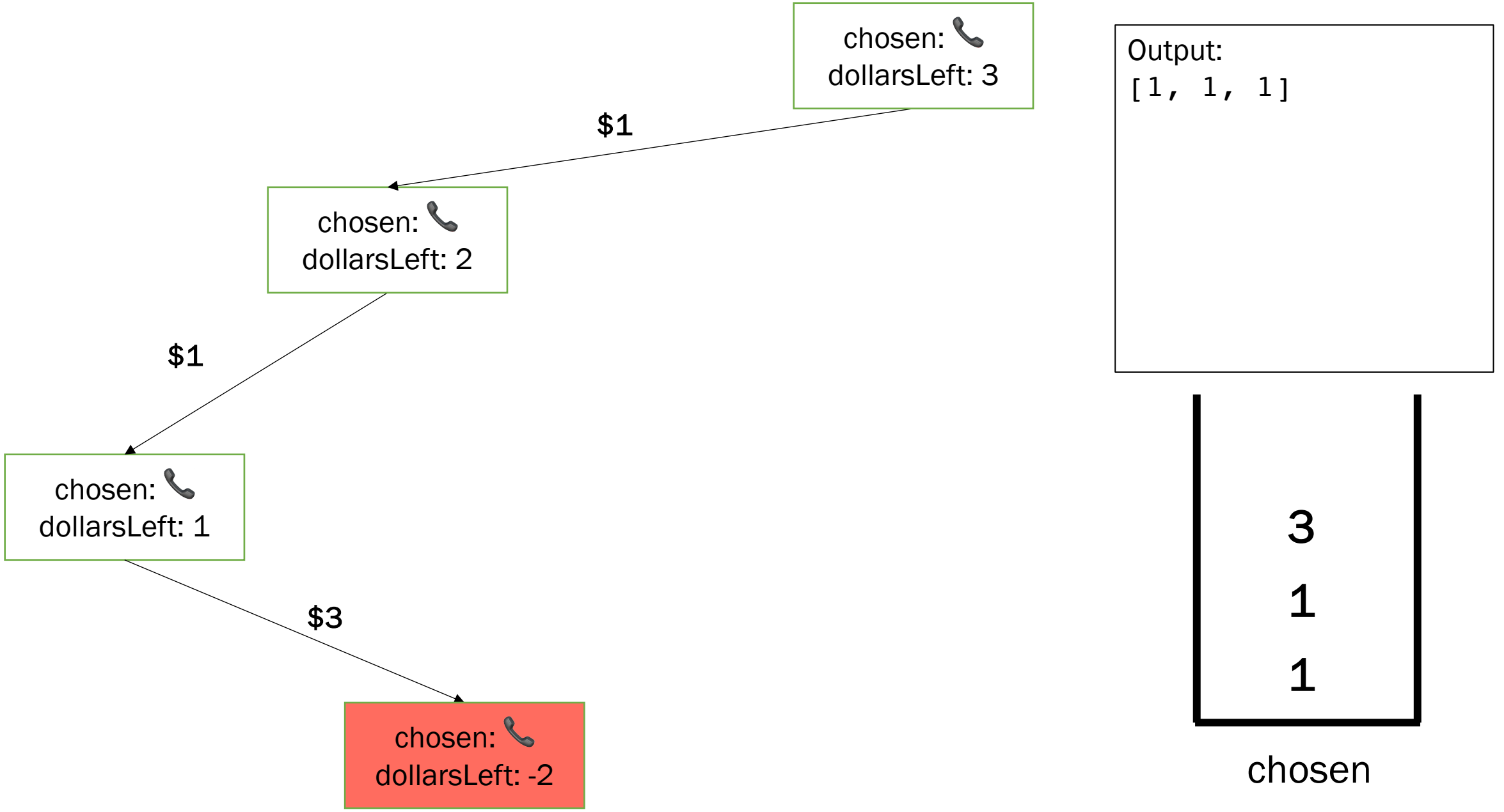

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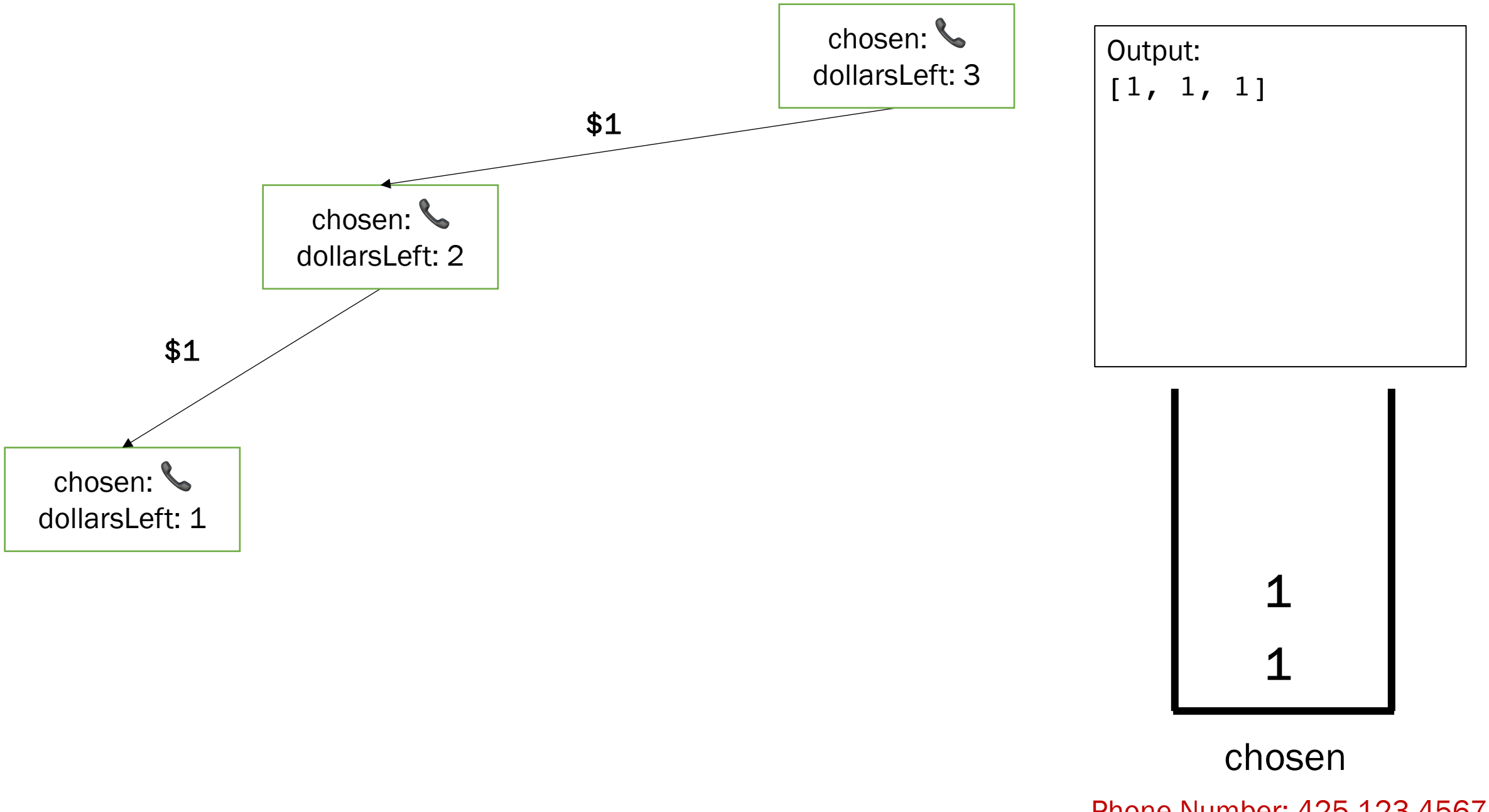
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chosen
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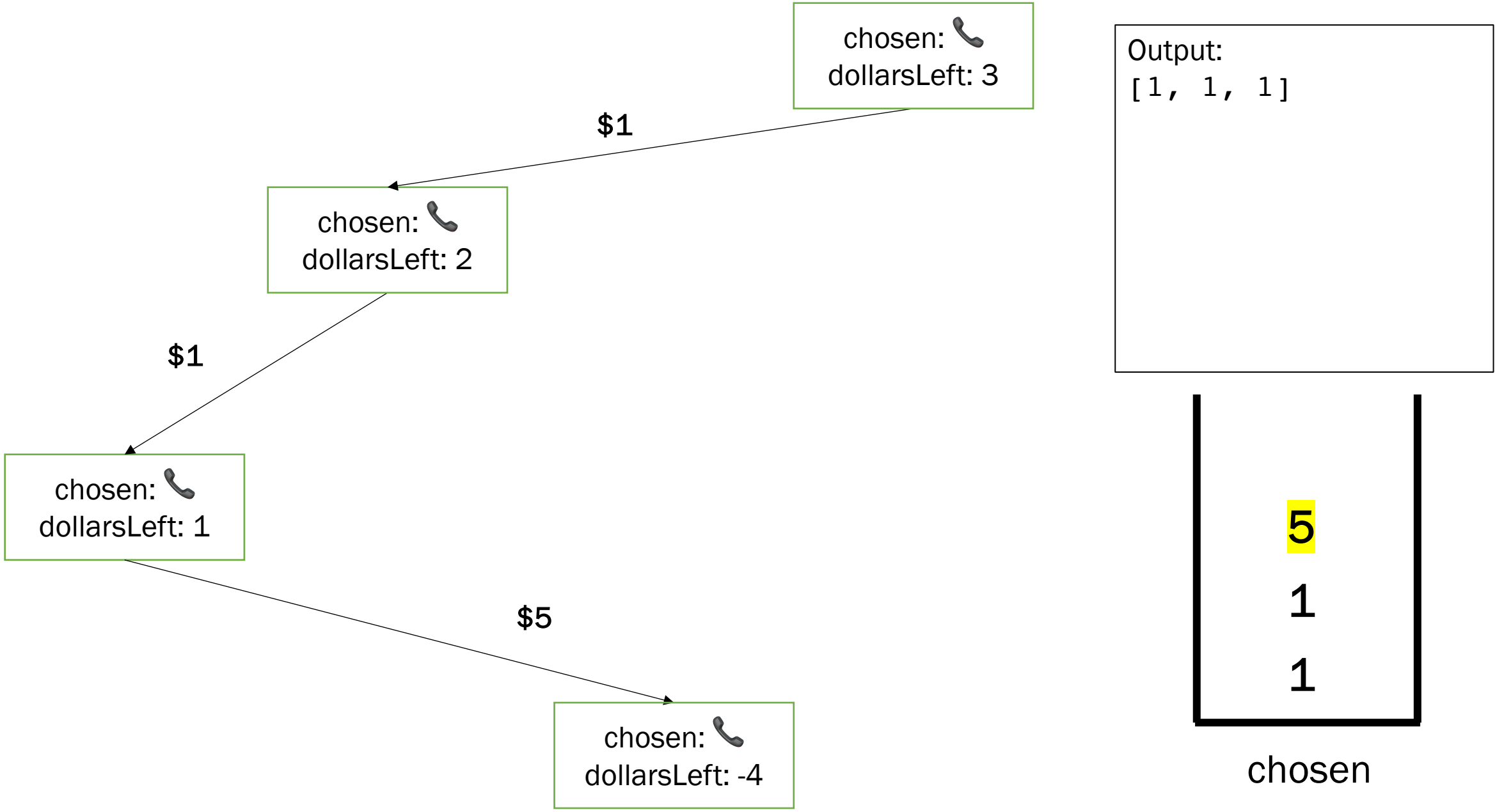
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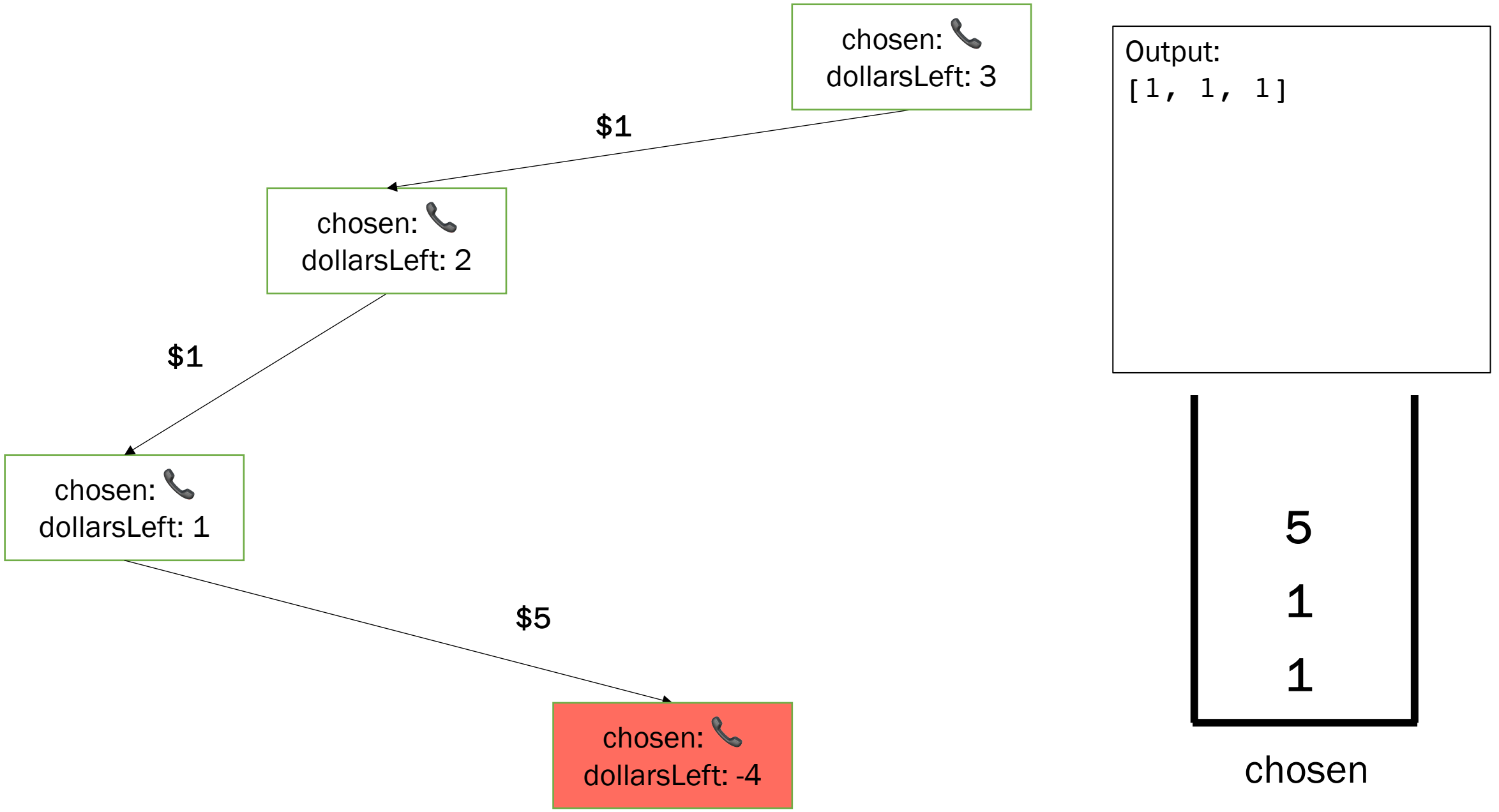
Output:
[1, 1, 1]
5
1
1
chosen
Phone Number: 425-123-4567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dollarsLeft: 1
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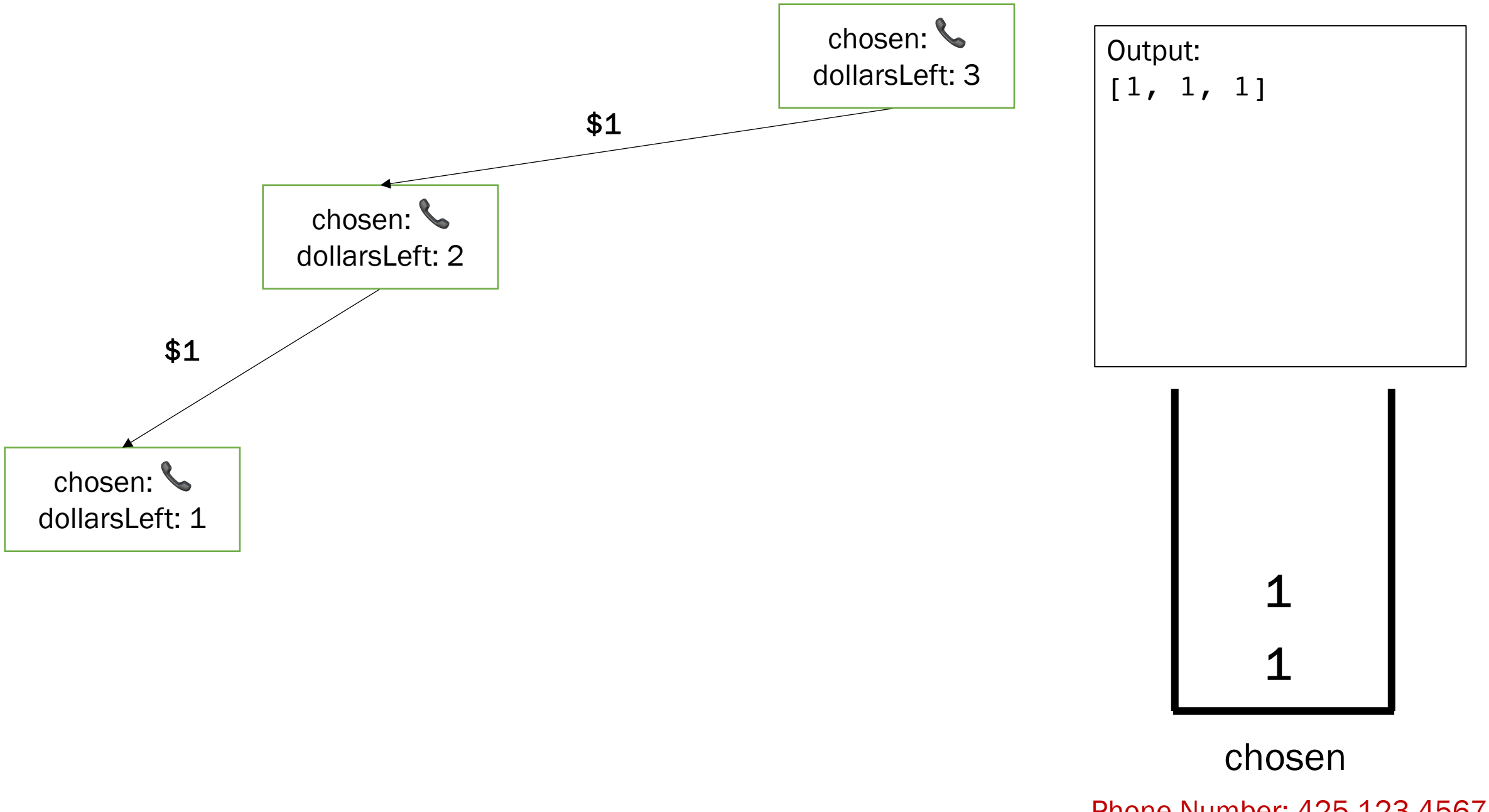
dollarsLeft: -4
Output:
[1, 1, 1]
5
1
1
chosen
Phone Number: 425-123-4567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dollarsLeft: 1
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chosen
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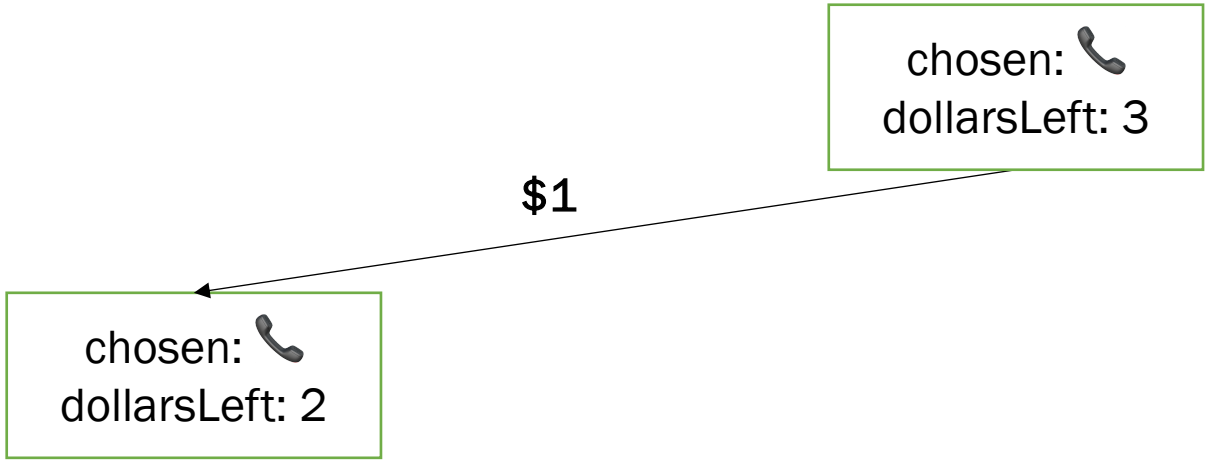

Output:
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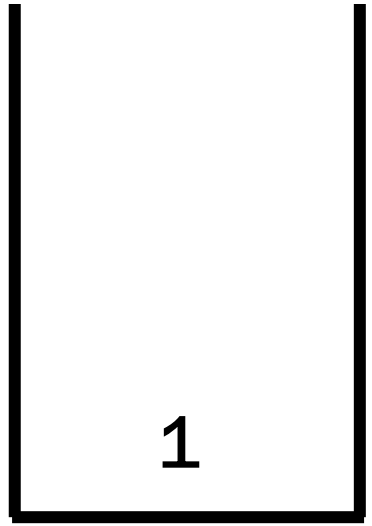

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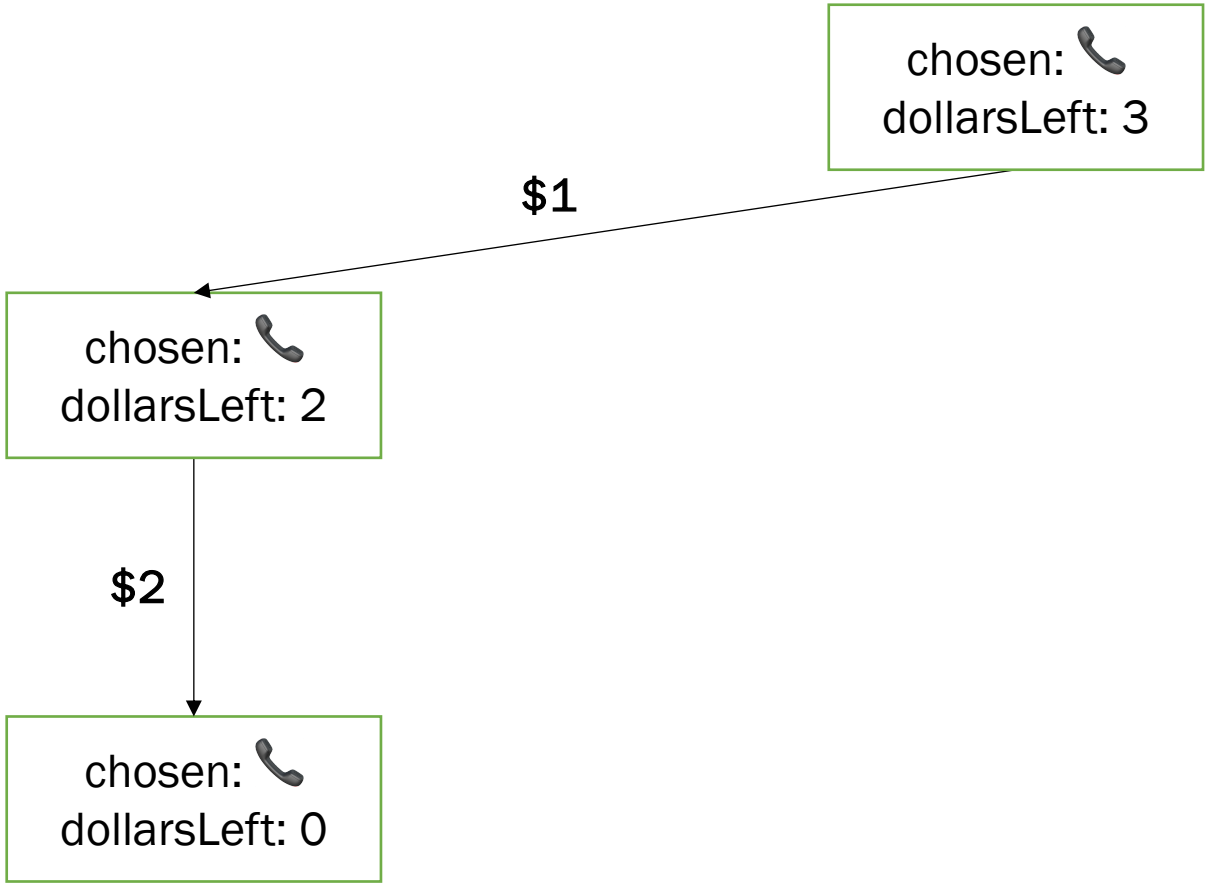

Output:

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[1, 1, 1]
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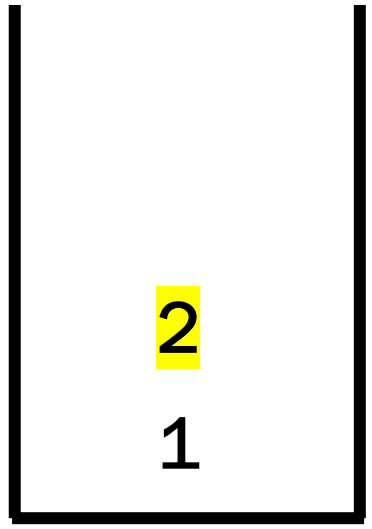

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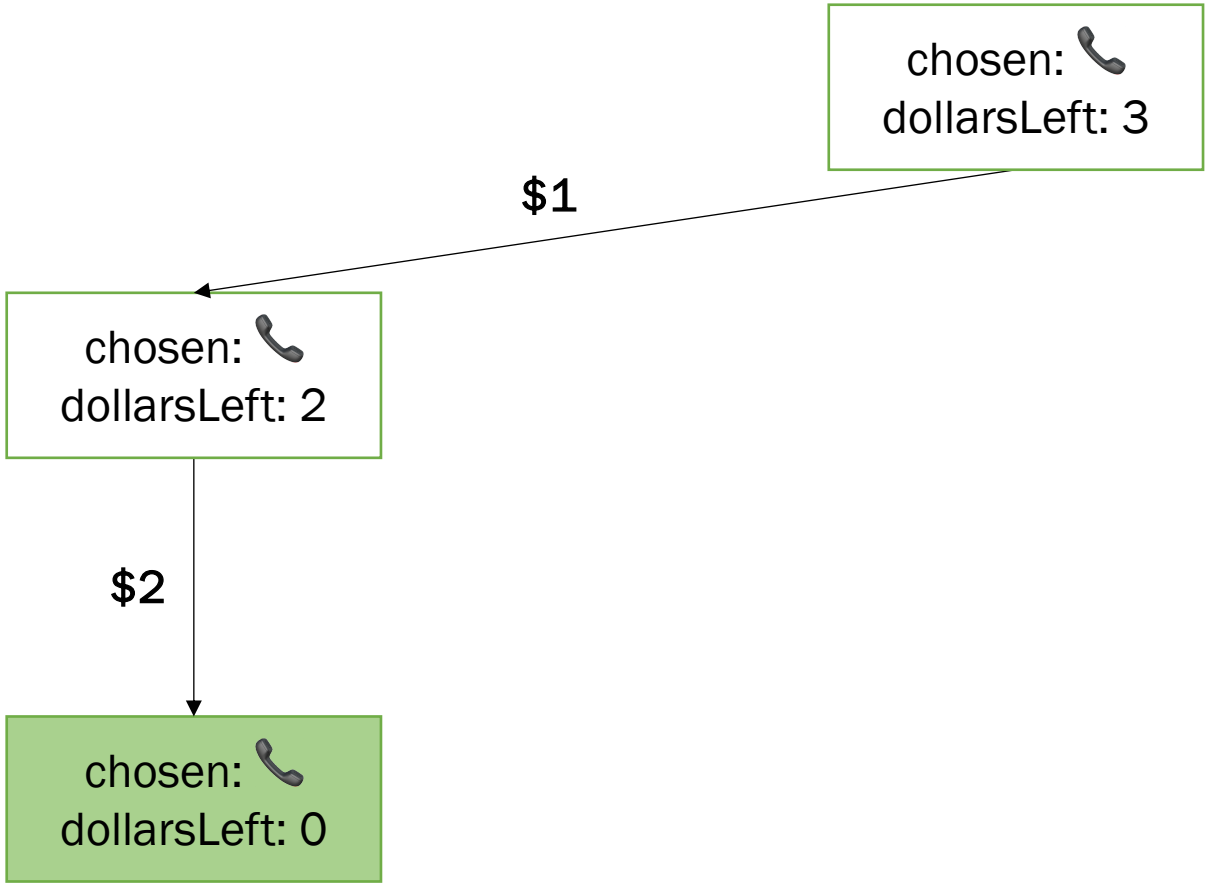

Output:

```
[1, 1, 1]
[1, 2]
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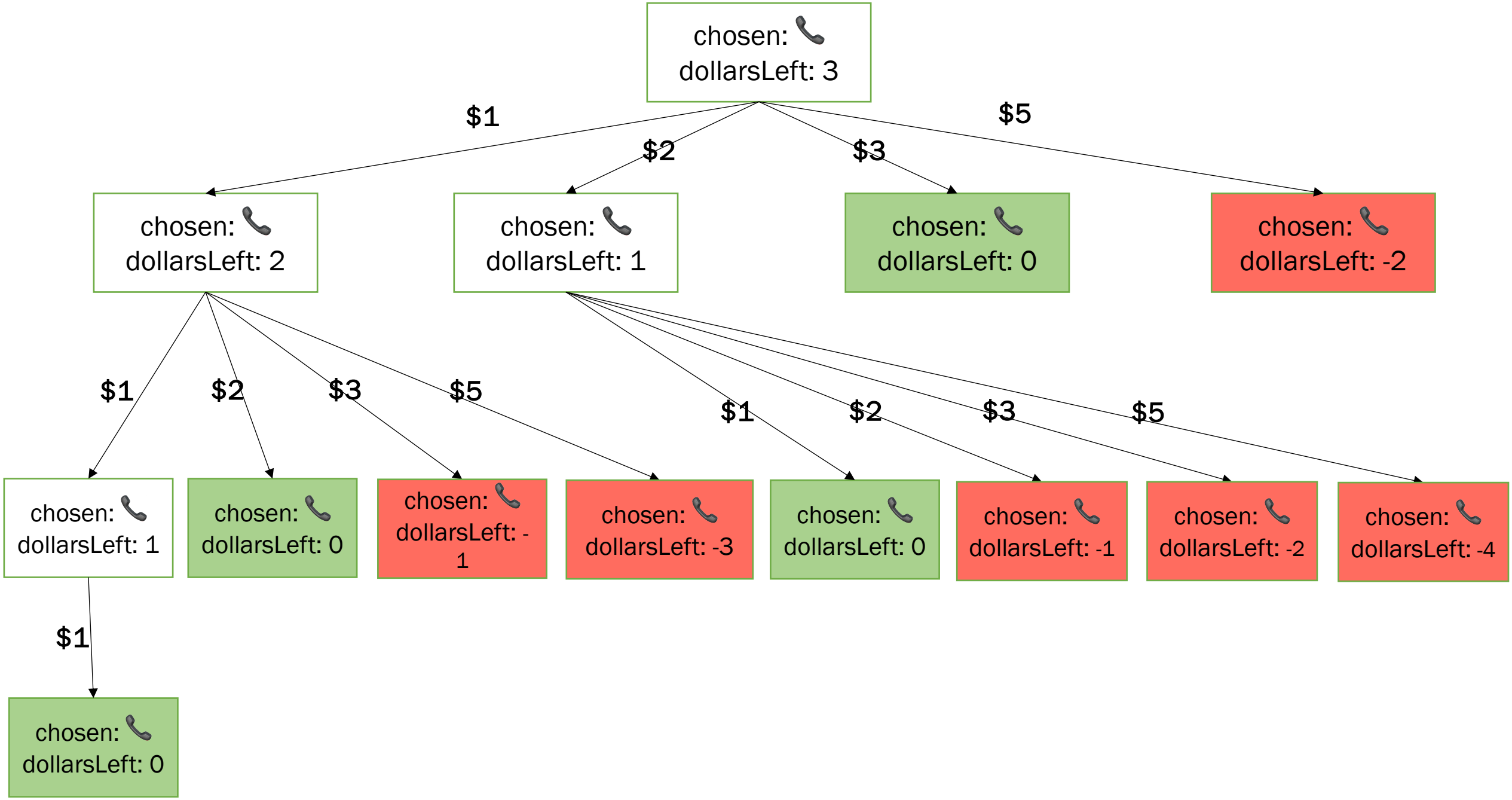
2

1

chosen

Phone Number: 425-123-4567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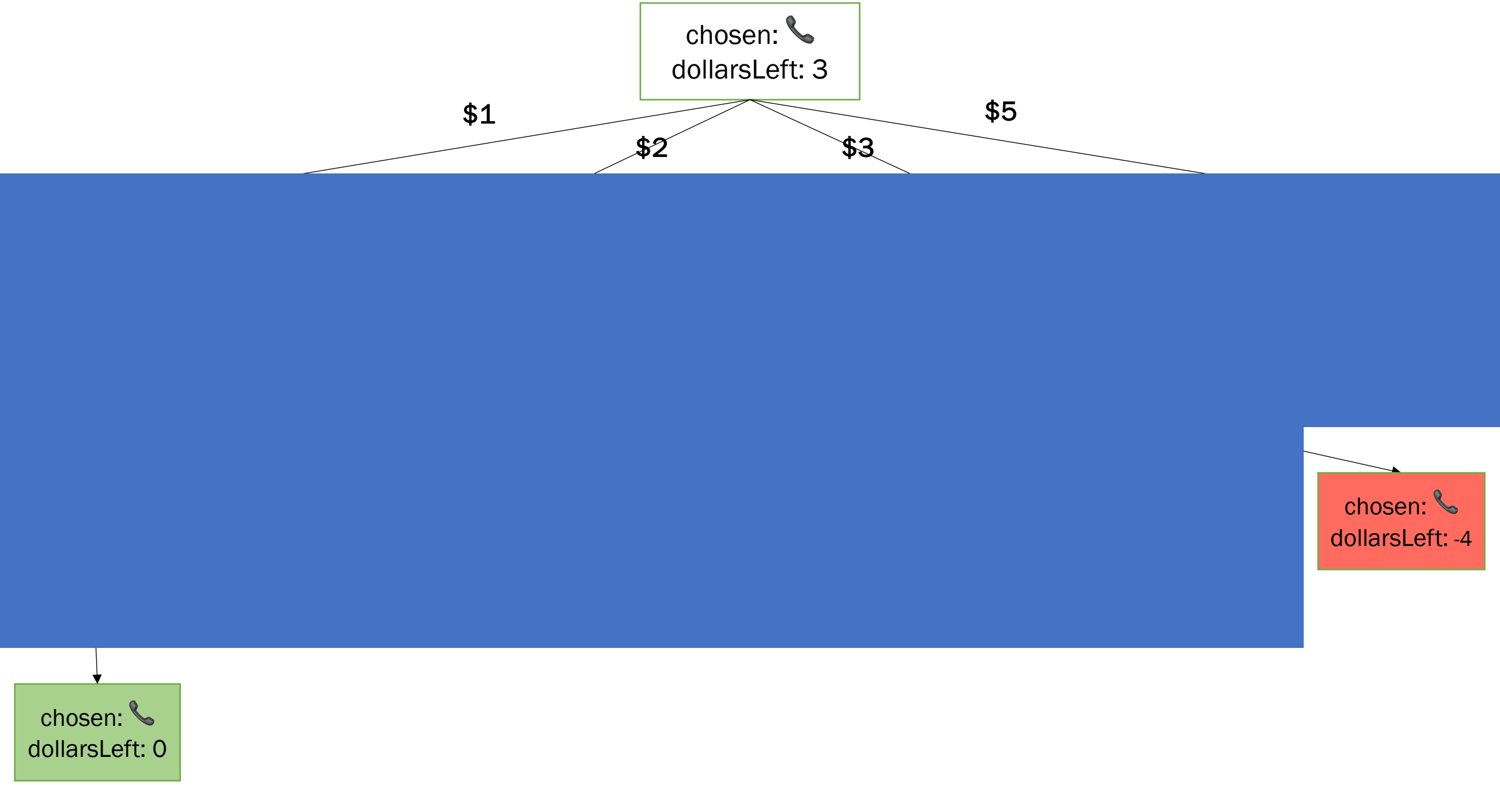
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$5
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dollarsLeft: -4
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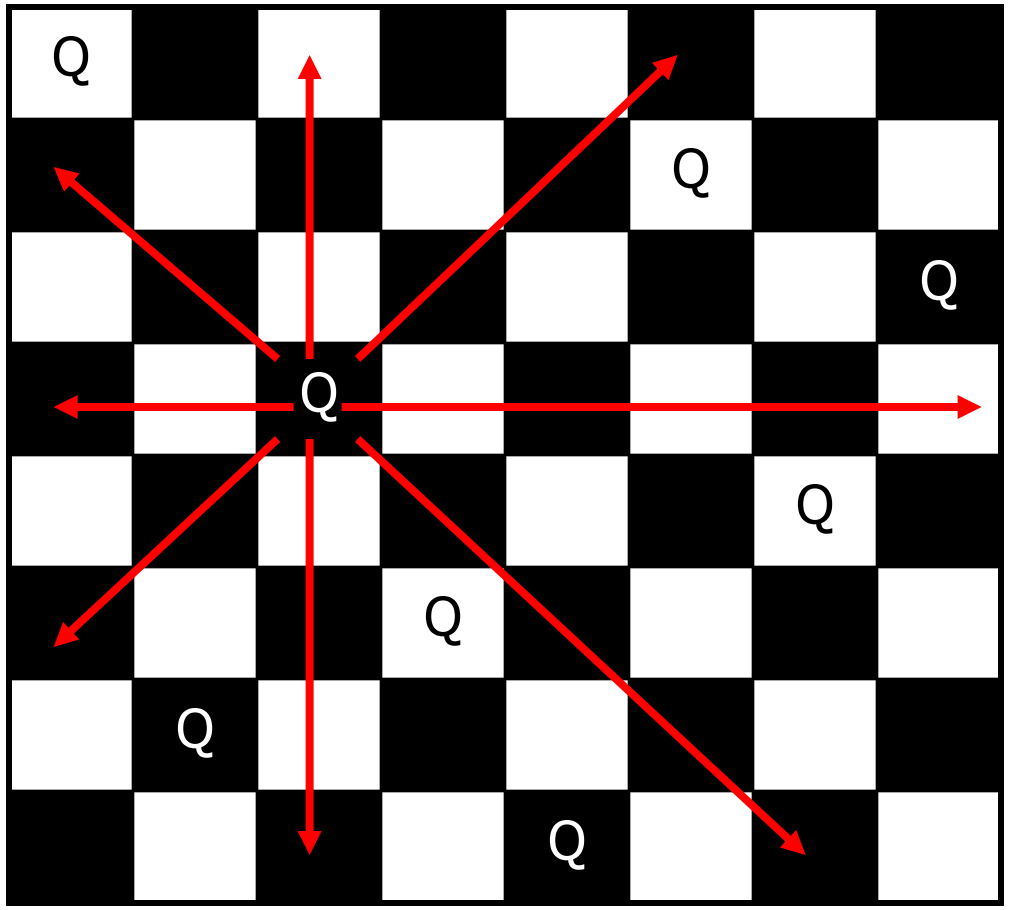
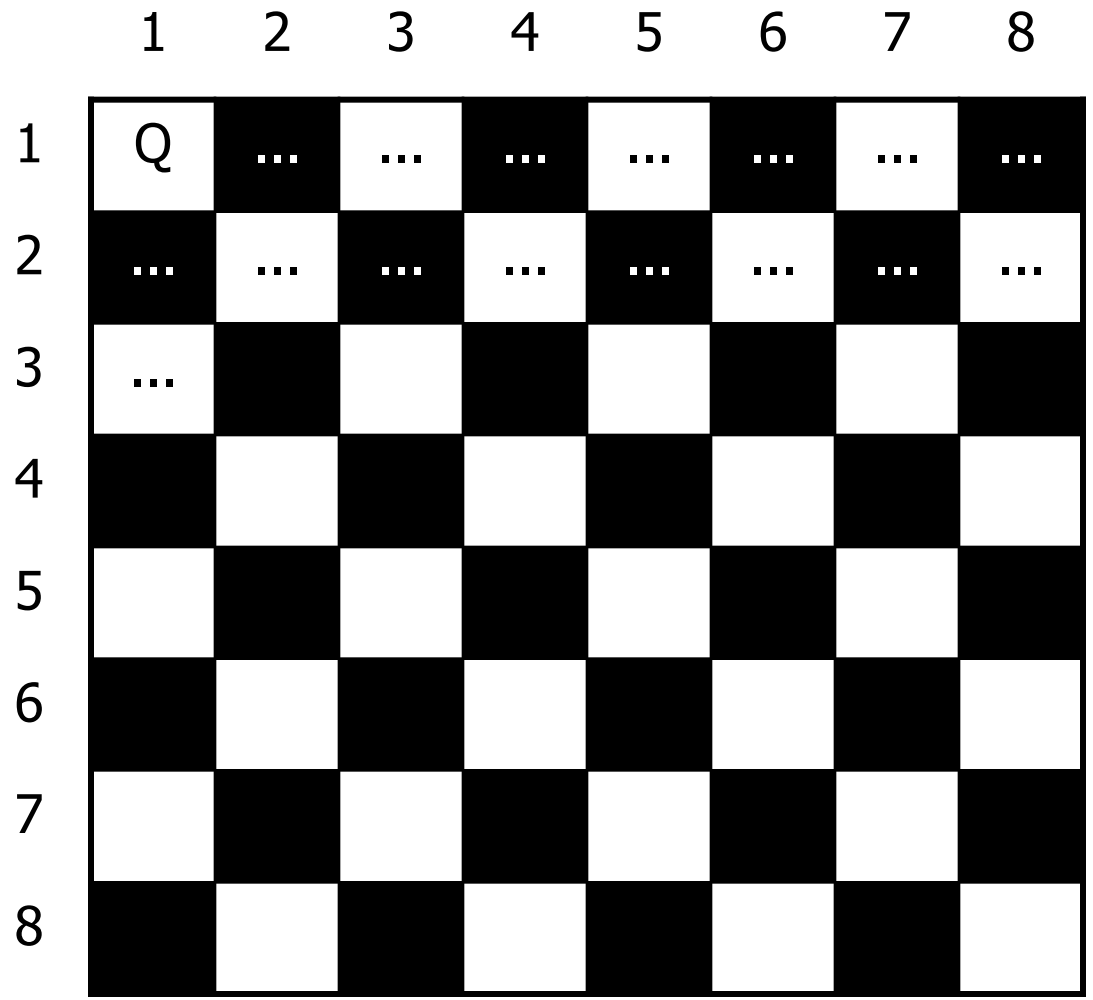
The "8 Queens" problem

- Consider the problem of trying to place 8 queens on a chess board such that no queen can attack another queen.
  - What are the "choices"?
  - How do we "make" or "un-make" a choice?
  - How do we know when to stop?



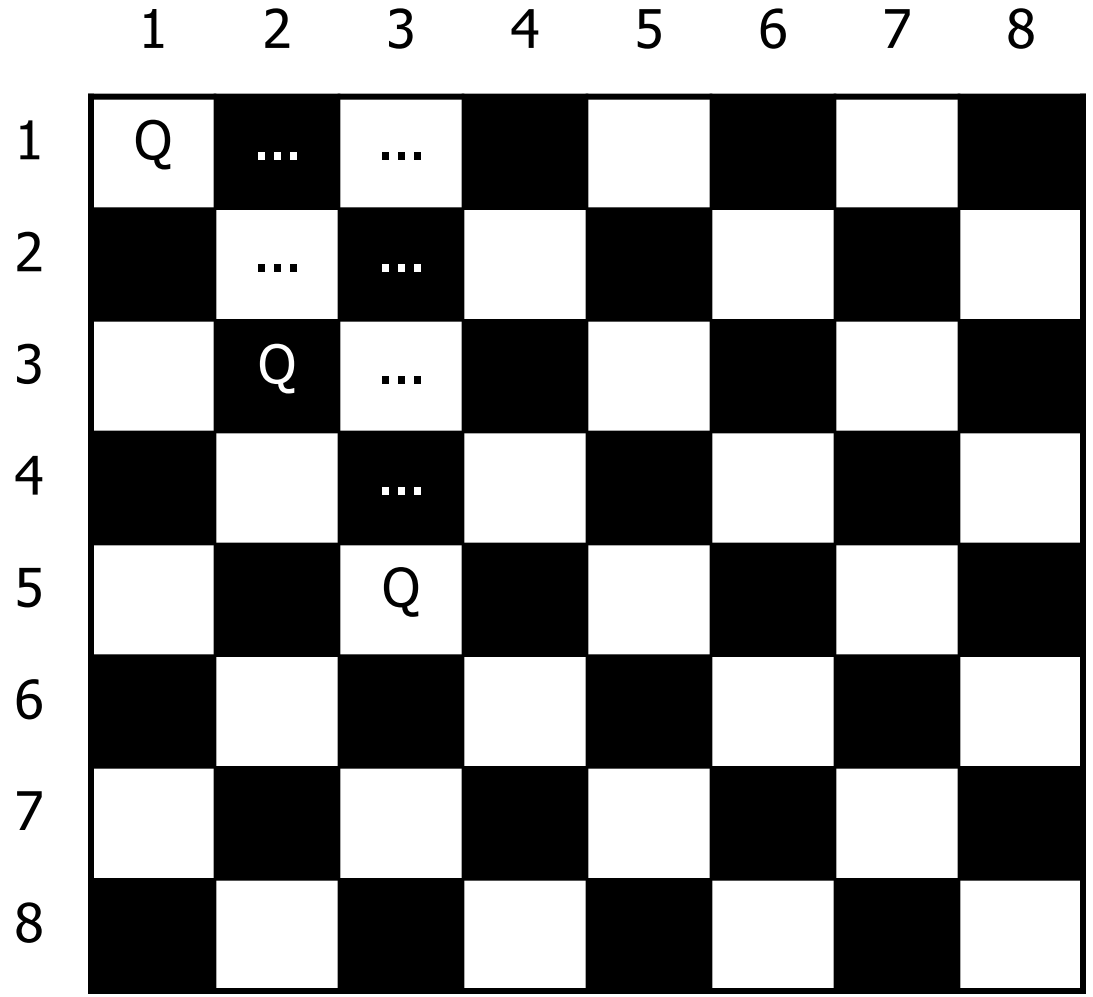
Naive algorithm

- for (each square on board):
  - Place a queen there.
  - Try to place the rest of the queens.
  - Un-place the queen.



Better algorithm idea

- Observation: In a working solution, exactly 1 queen must appear in each column.
  - Redefine a "choice" to be valid placement of a queen in a particular **column**.



`solve`

- Write a method `solve` that accepts a `Board` as a parameter and prints out all the ways to place `n` queens on it.

`Board` class