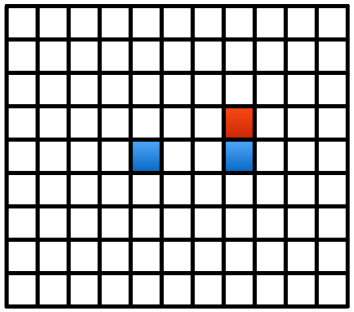
Subset Sum

- Recurrence:

$$\text{OPT}(i, w) = \begin{cases} \text{OPT}(i-1, w) & \text{if } w < w_i \\ \max(\text{OPT}(i-1, w), w_i + \text{OPT}(i-1, w-w_i)) & \text{otherwise} \end{cases}$$



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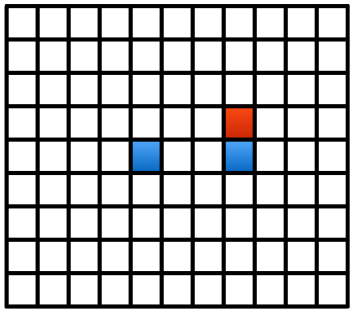
```
Array M[0…n][0…W]
Initialize M[0][w] = 0 for each w = 0,1,…,W
Subset-Sum(n,W)

Subset-Sum(i,w)
  if M[i][w] empty
    if w < wi
      M[i][w] = Subset-Sum(i-1,w)
    else
      M[i][w] = max(Subset-Sum(i-1,w), wi +
      Subsetsum(i-1,w-wi))
  return M[i][w]
```



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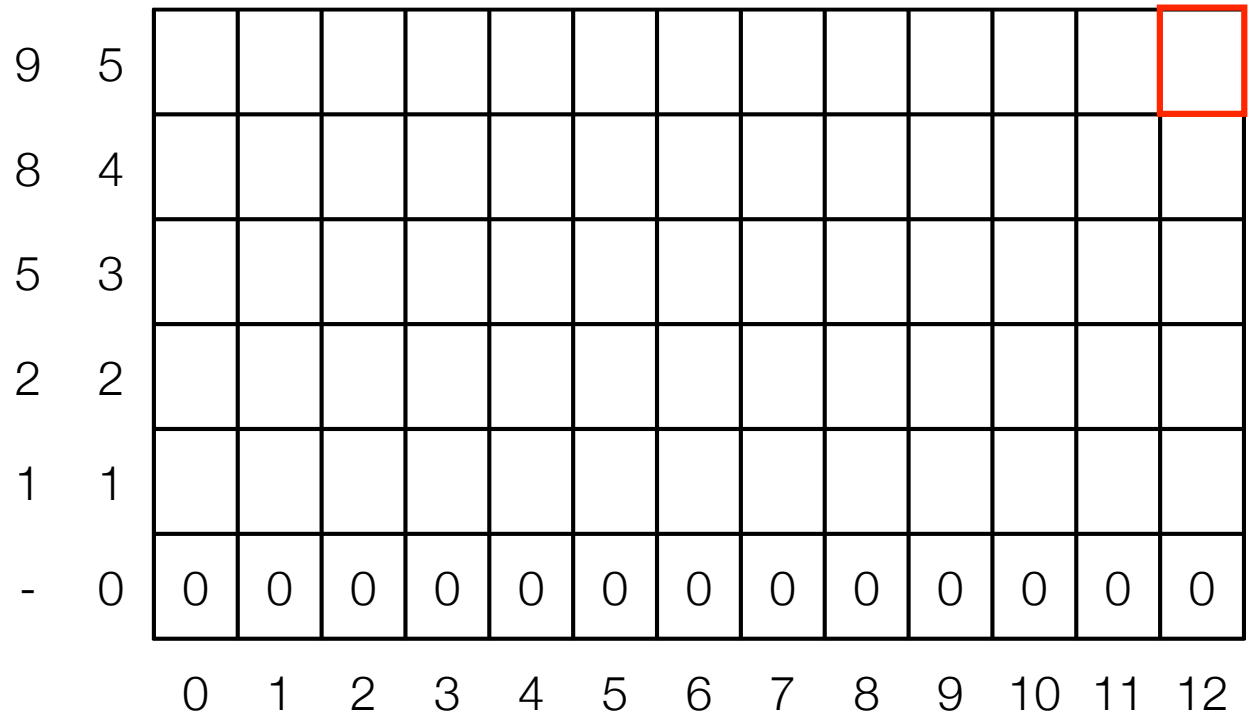

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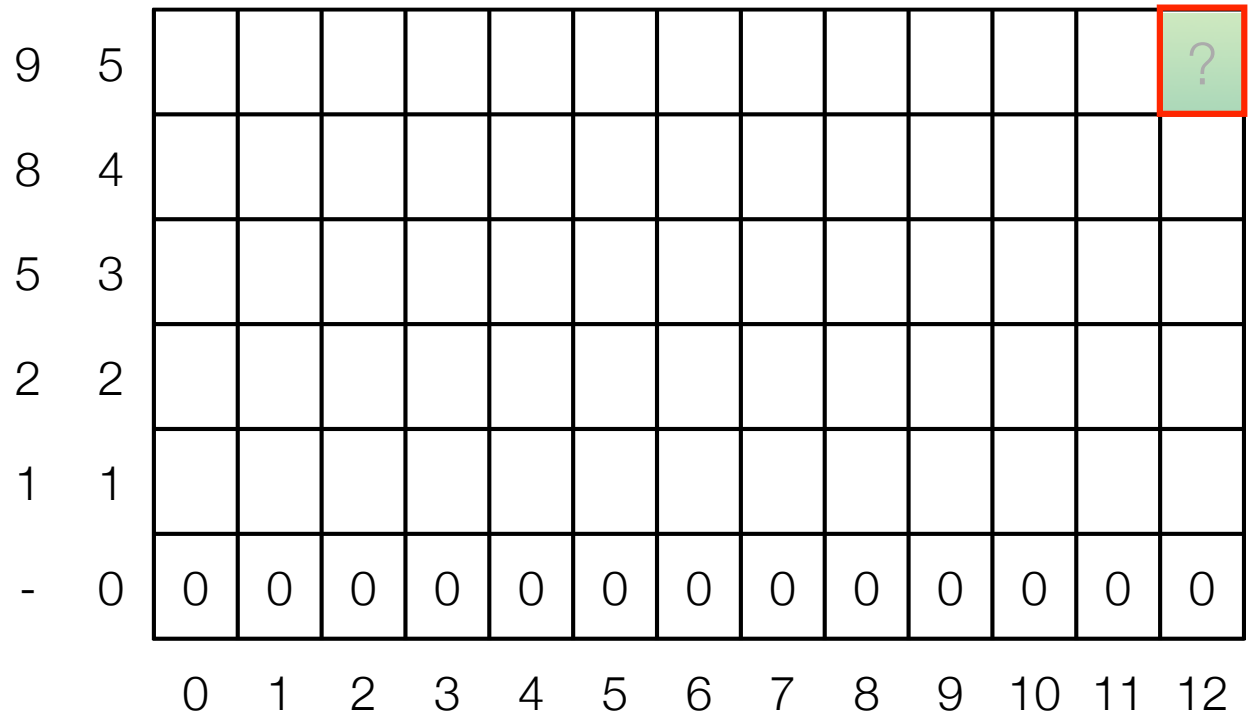

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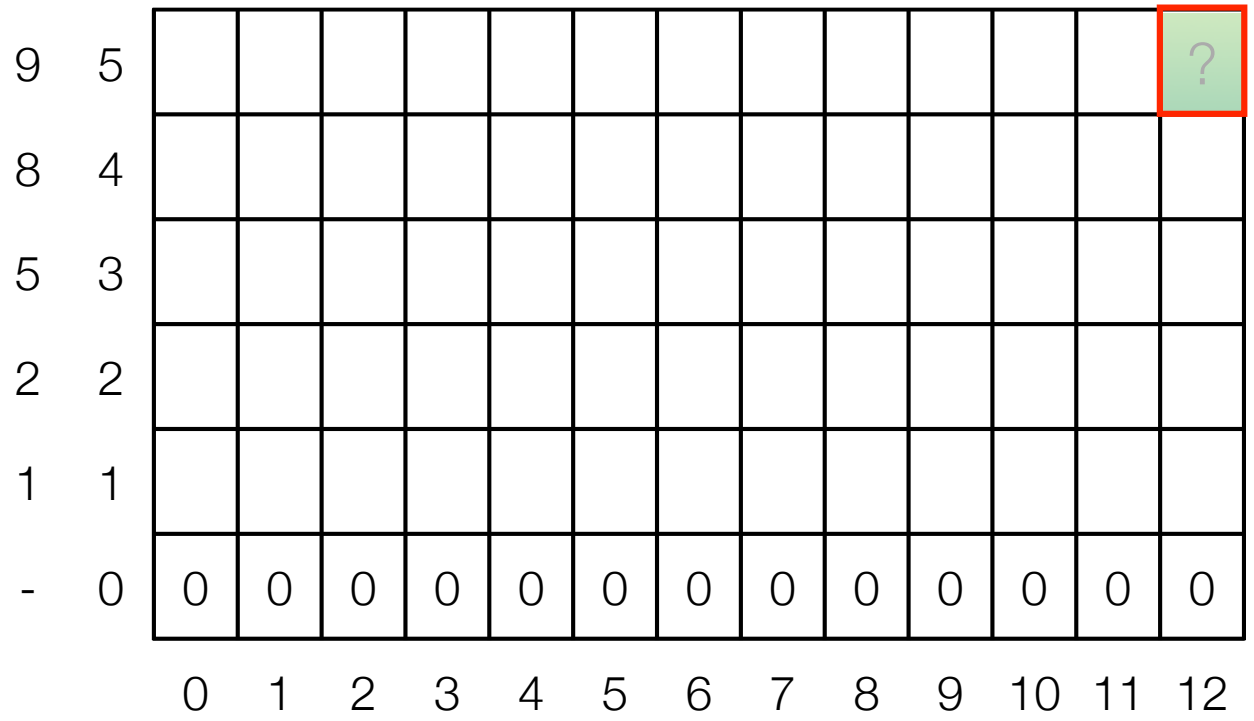

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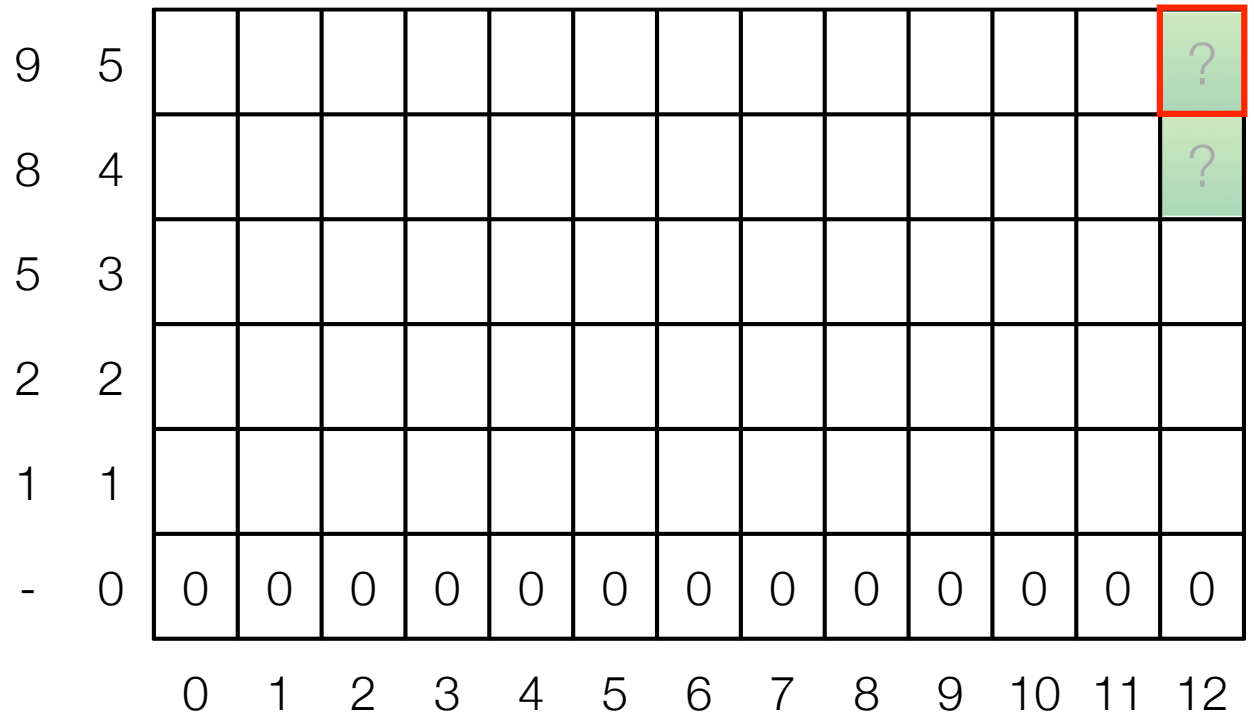

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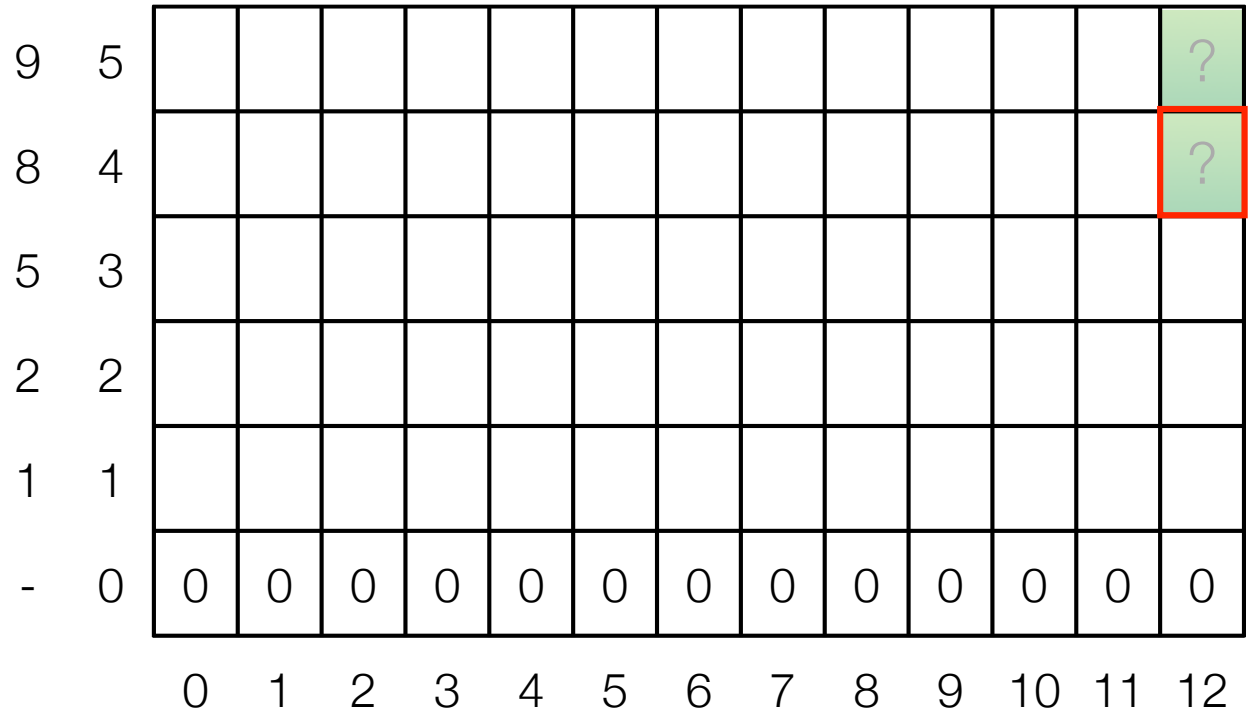

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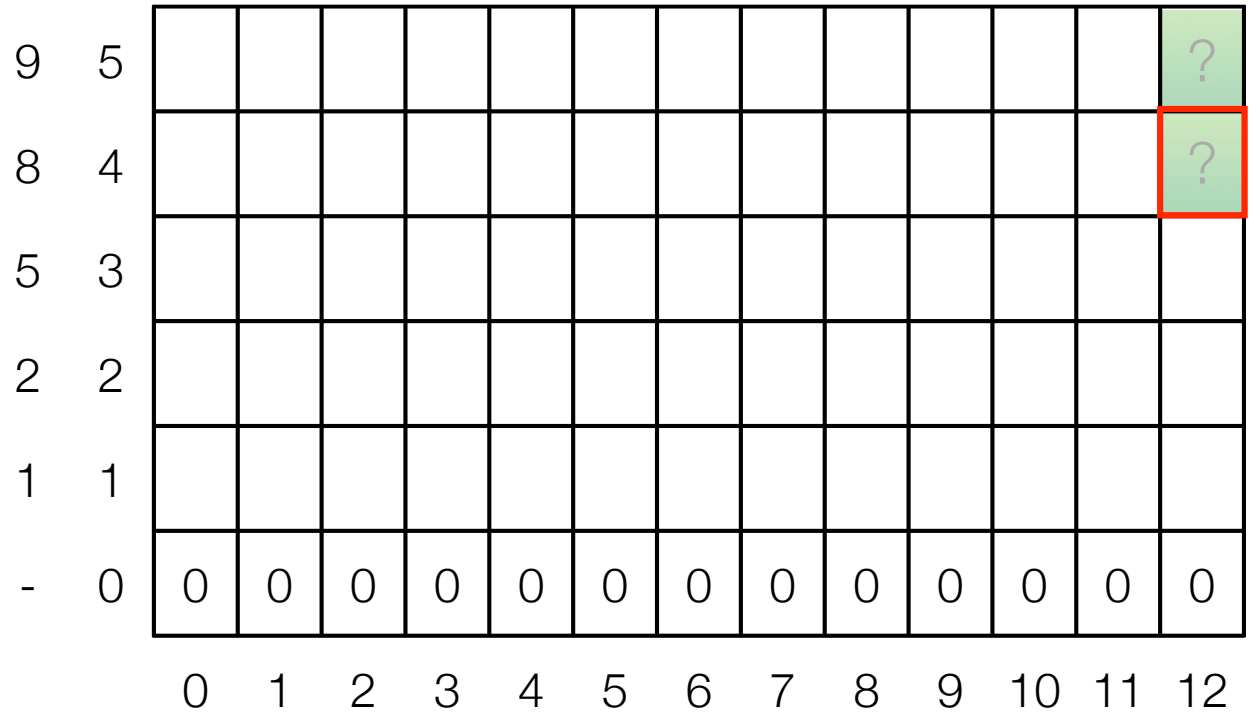

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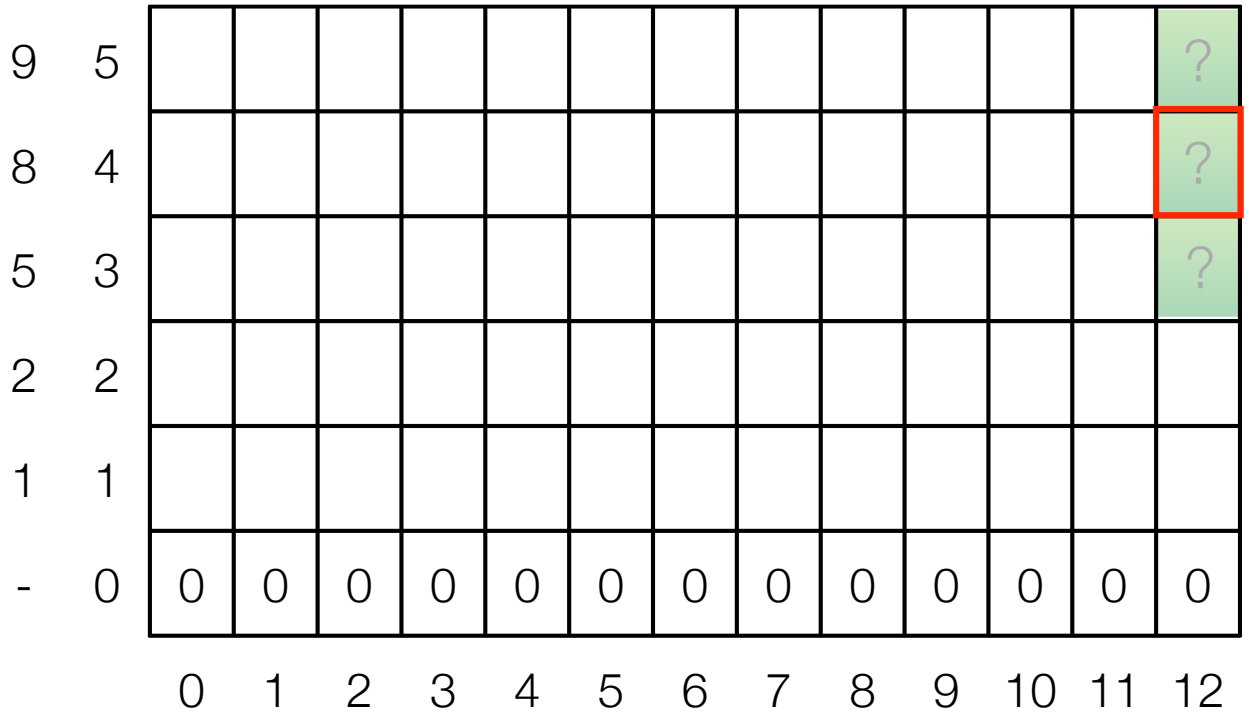

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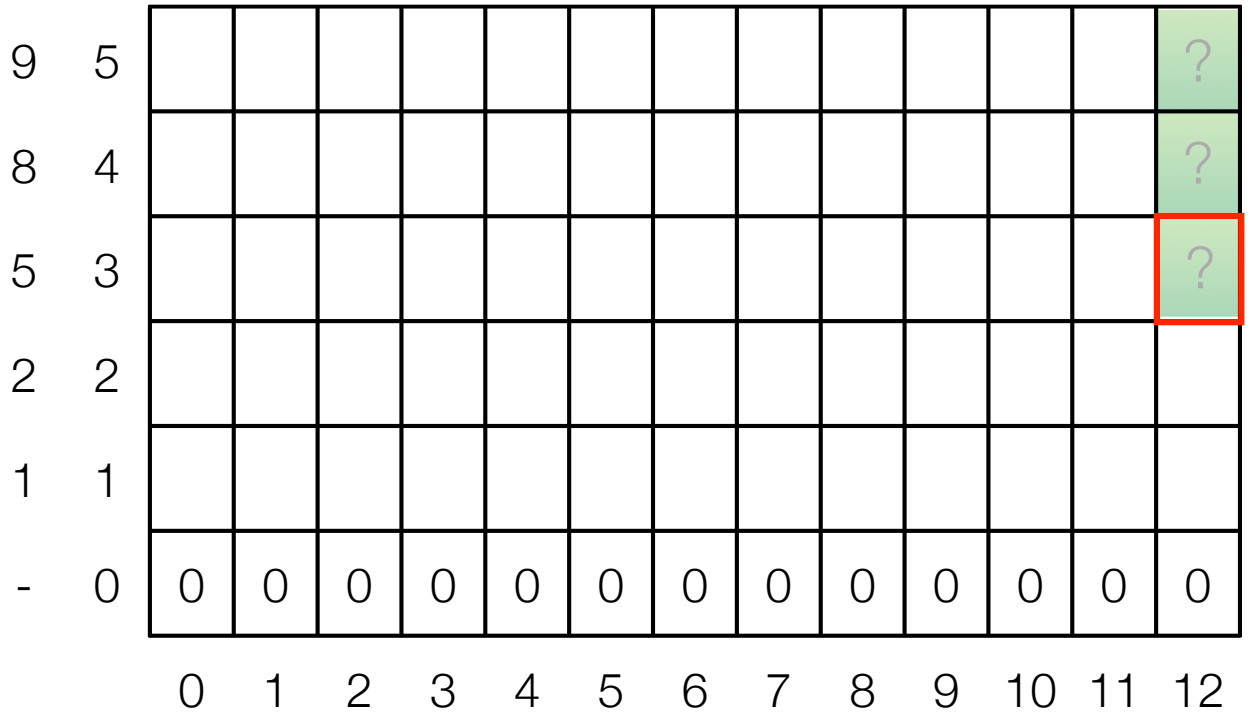

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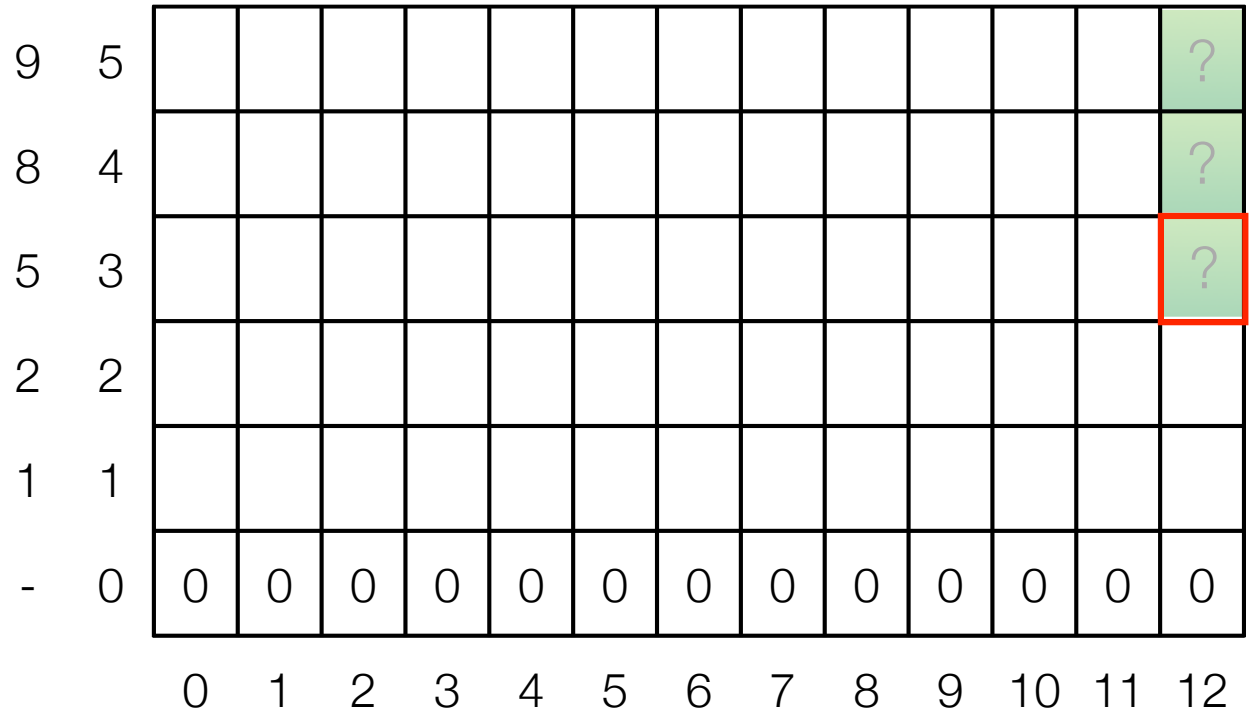

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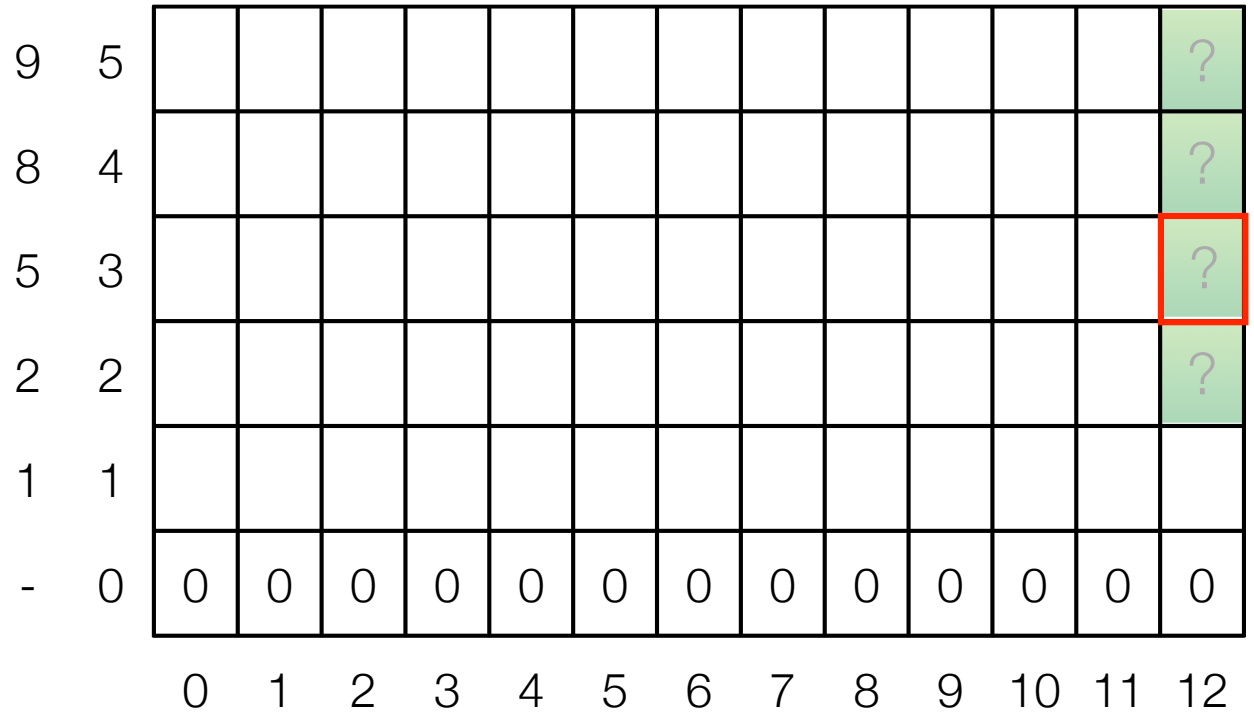

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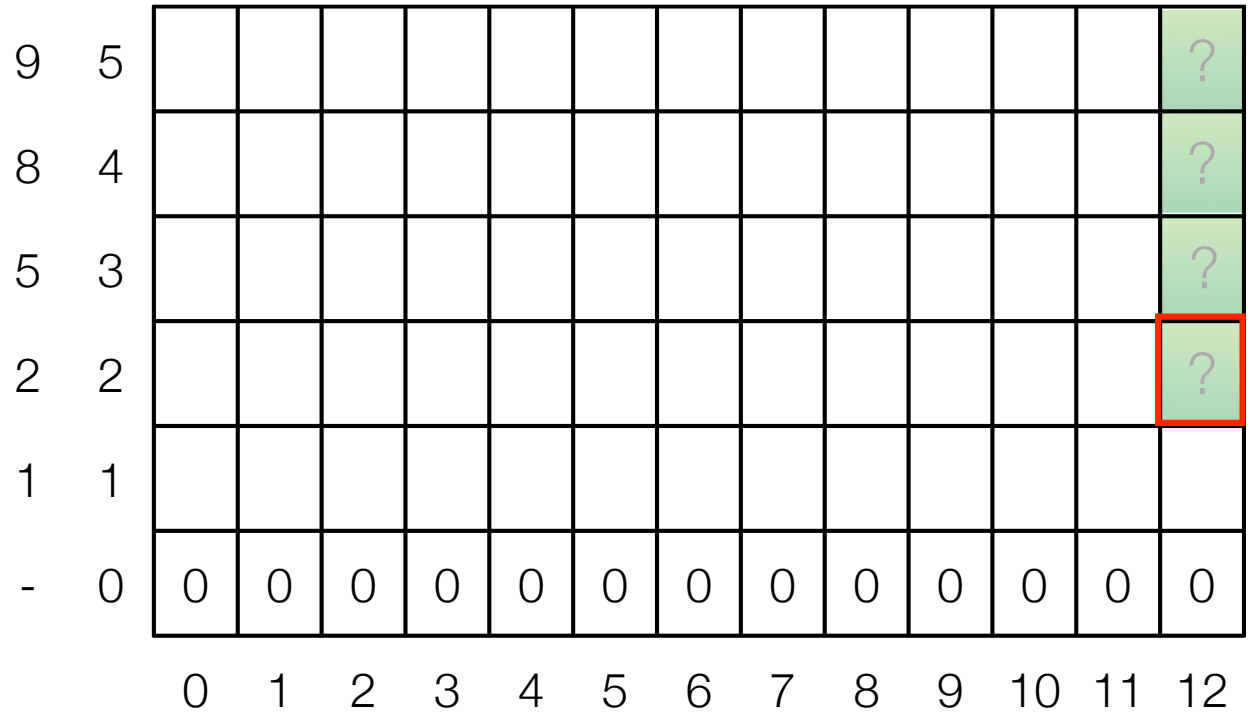

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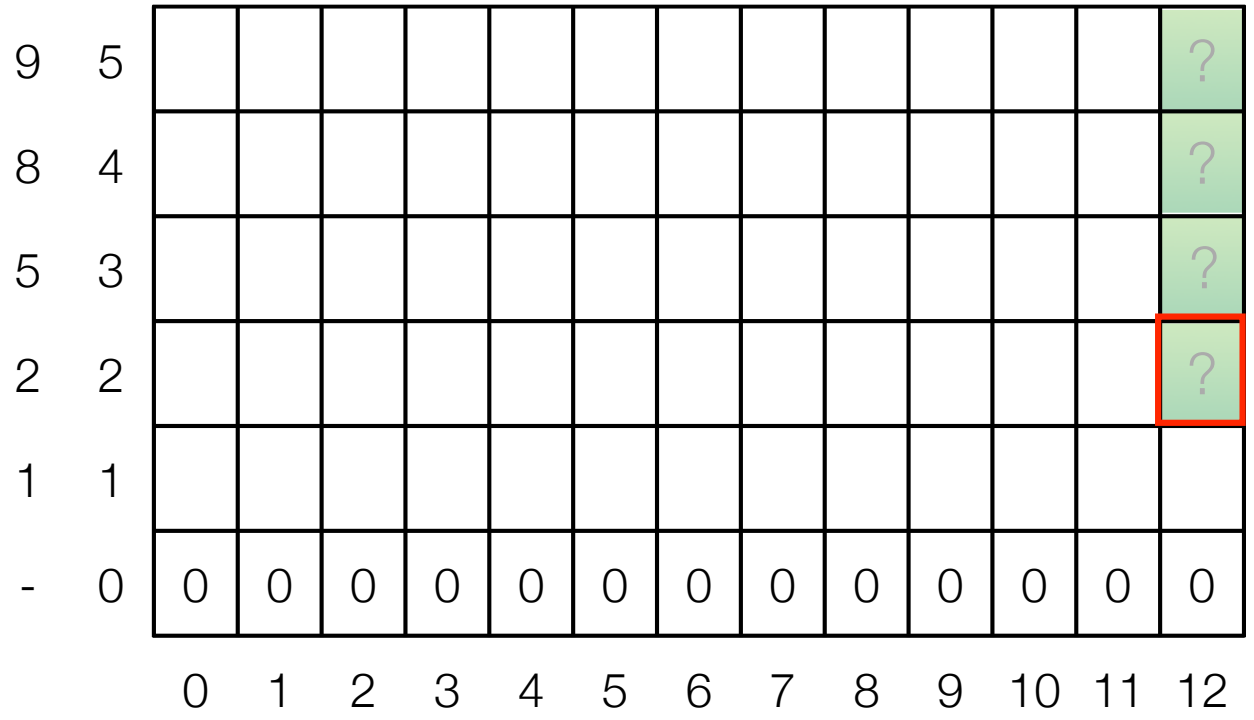

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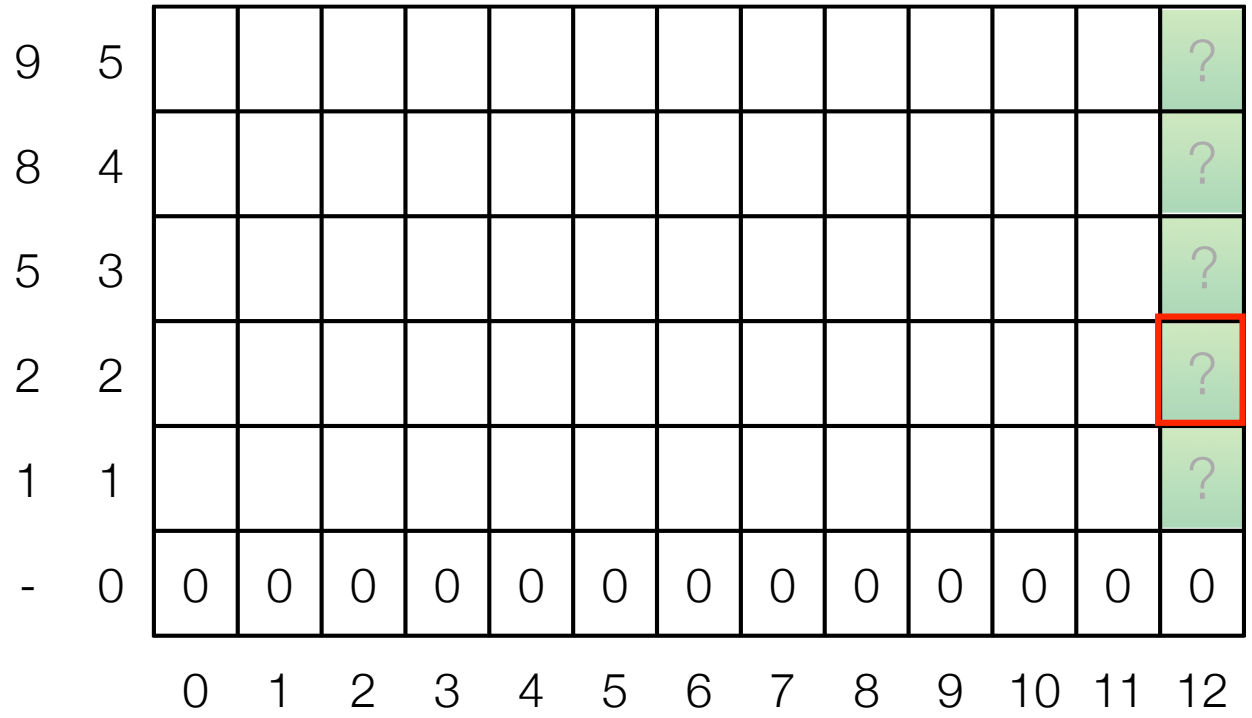

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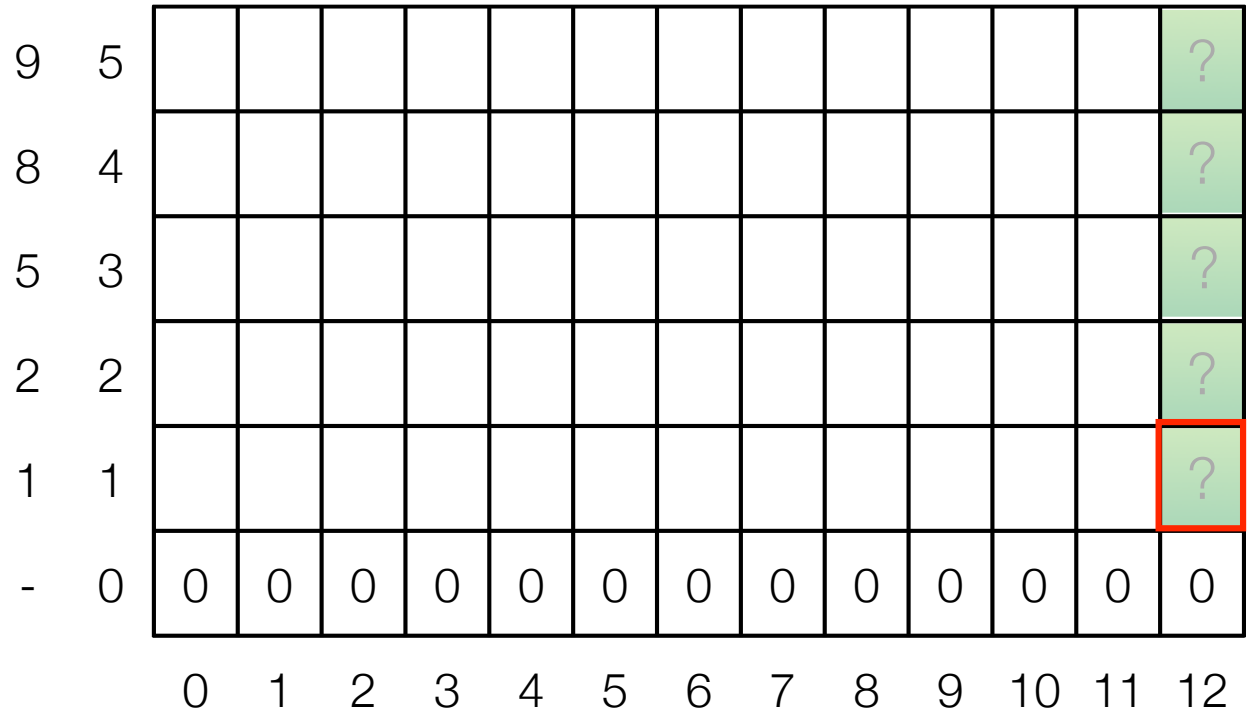

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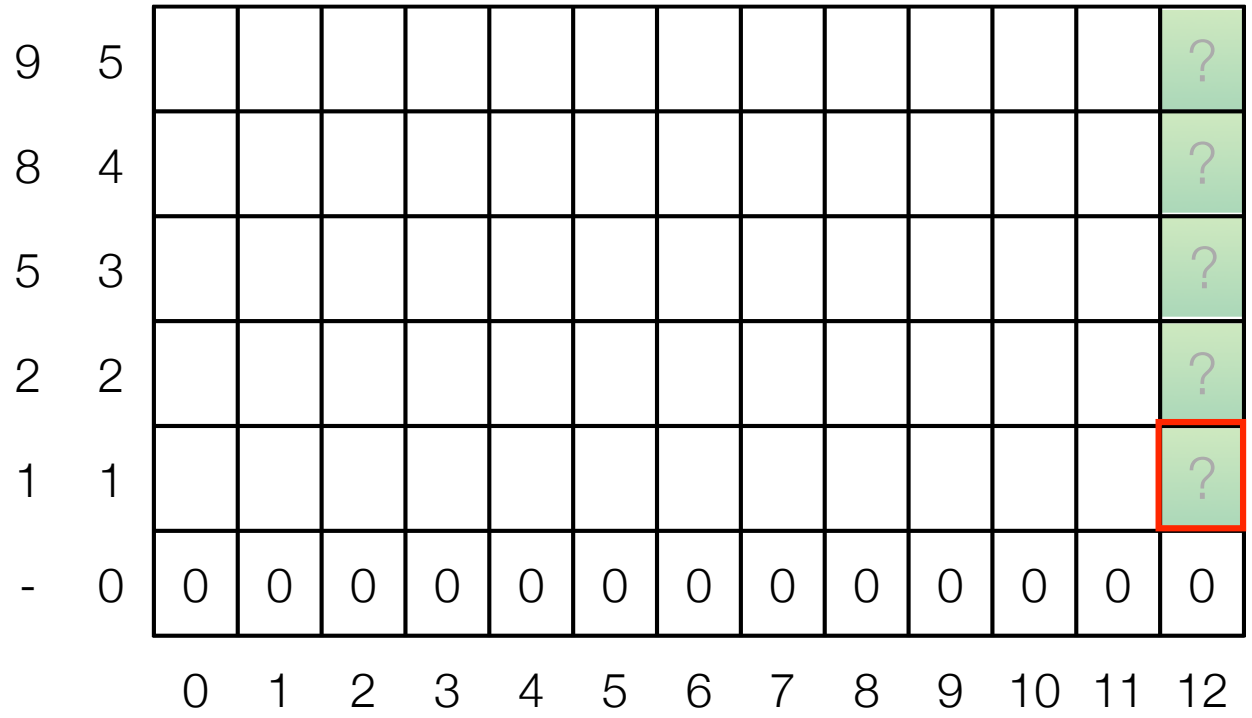

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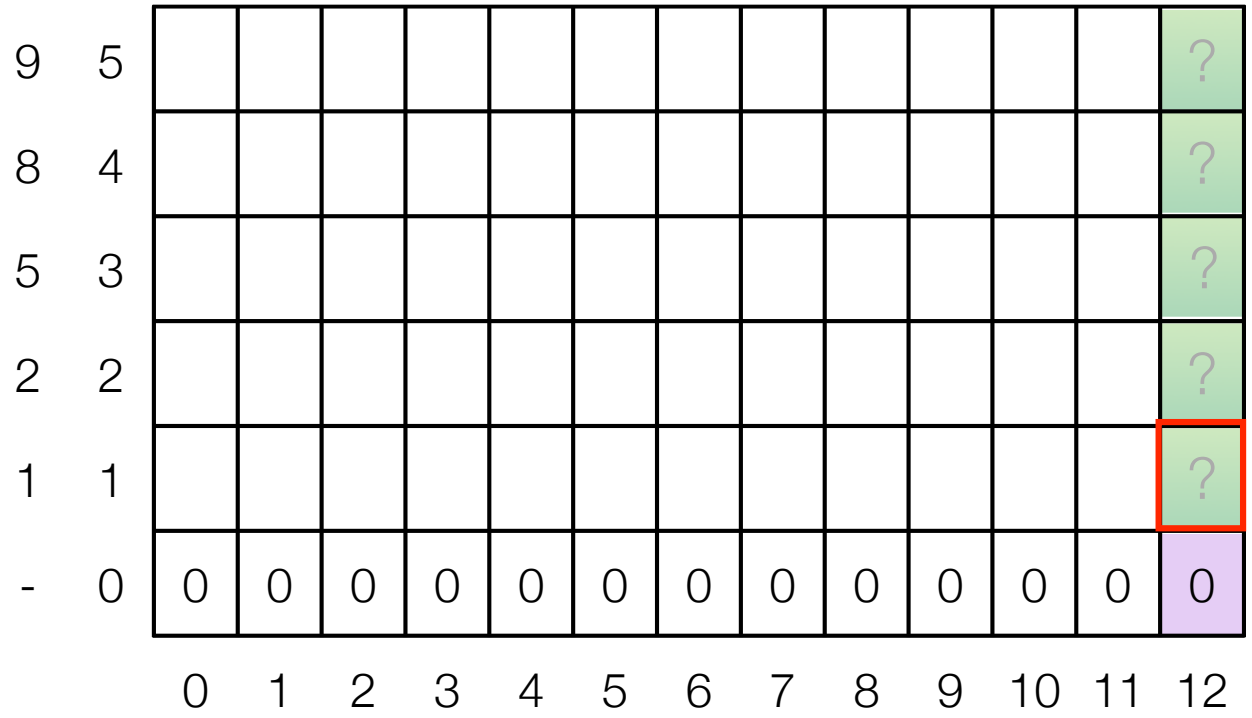

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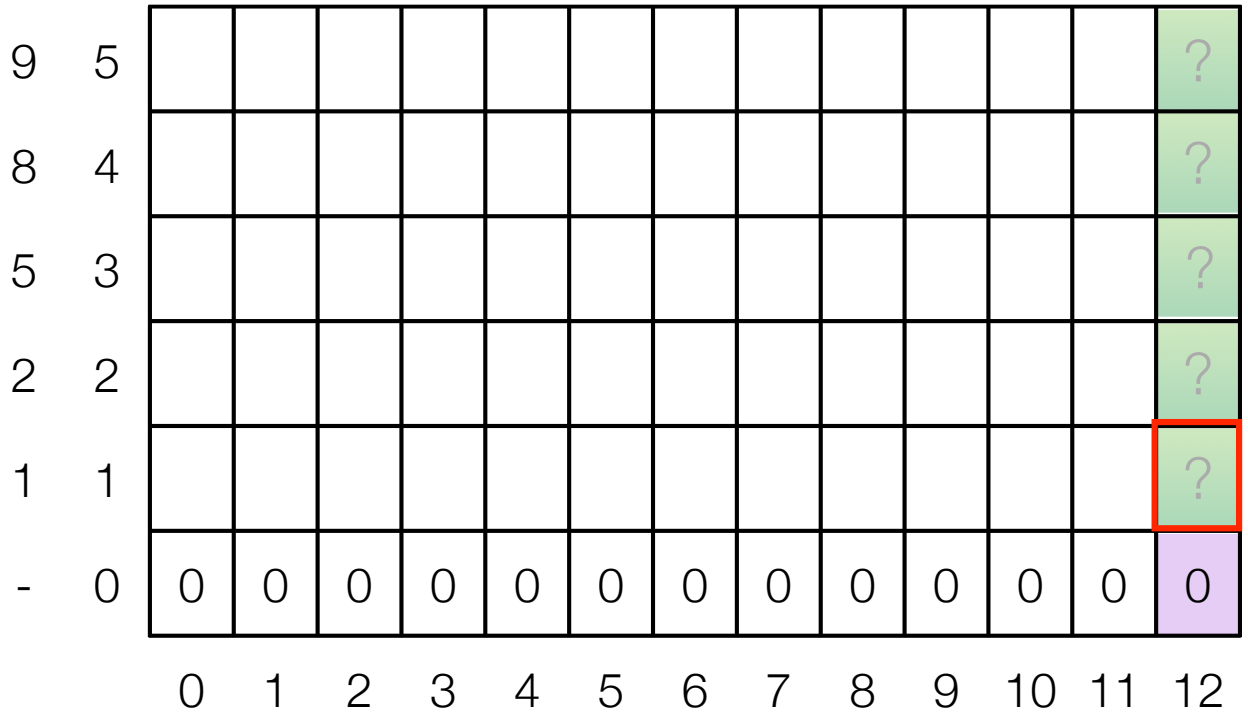

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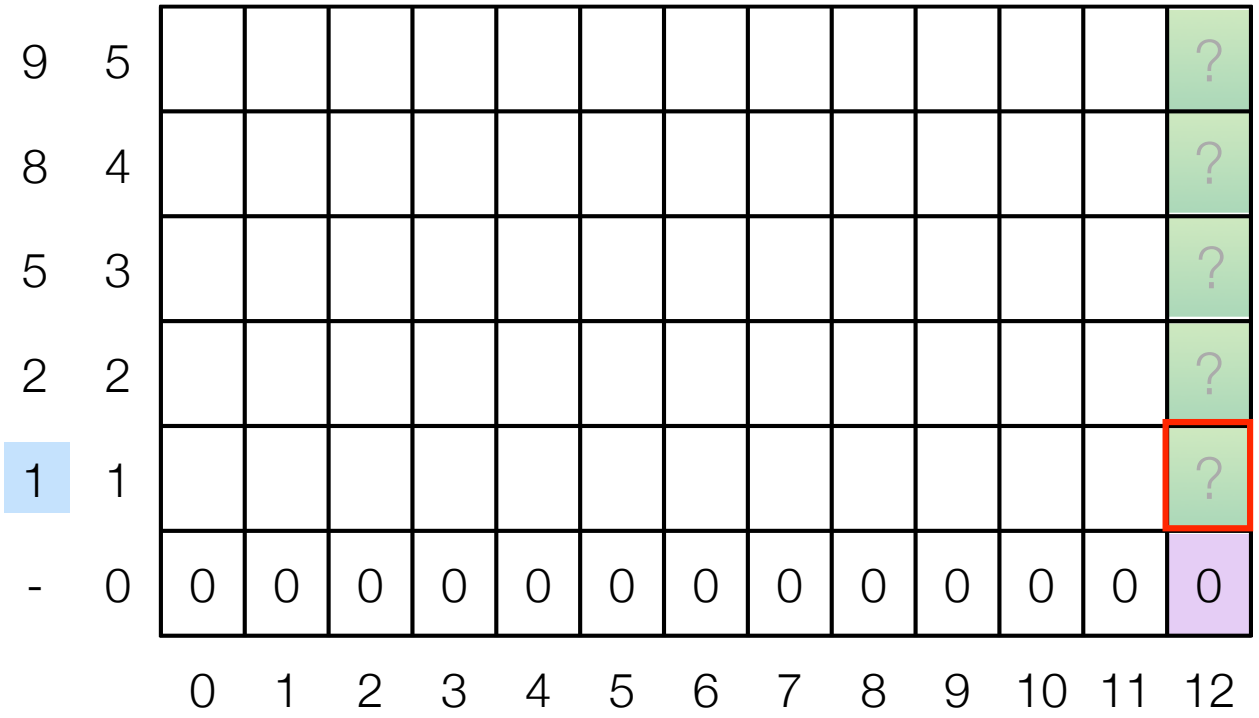

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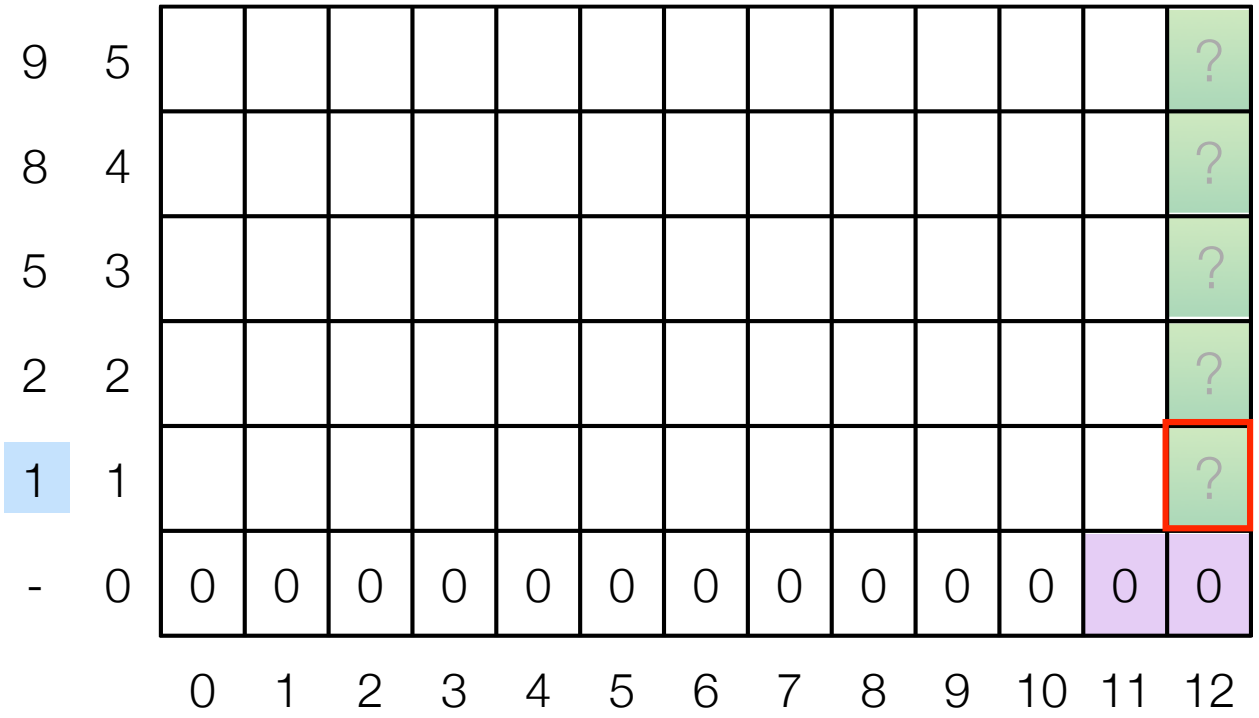

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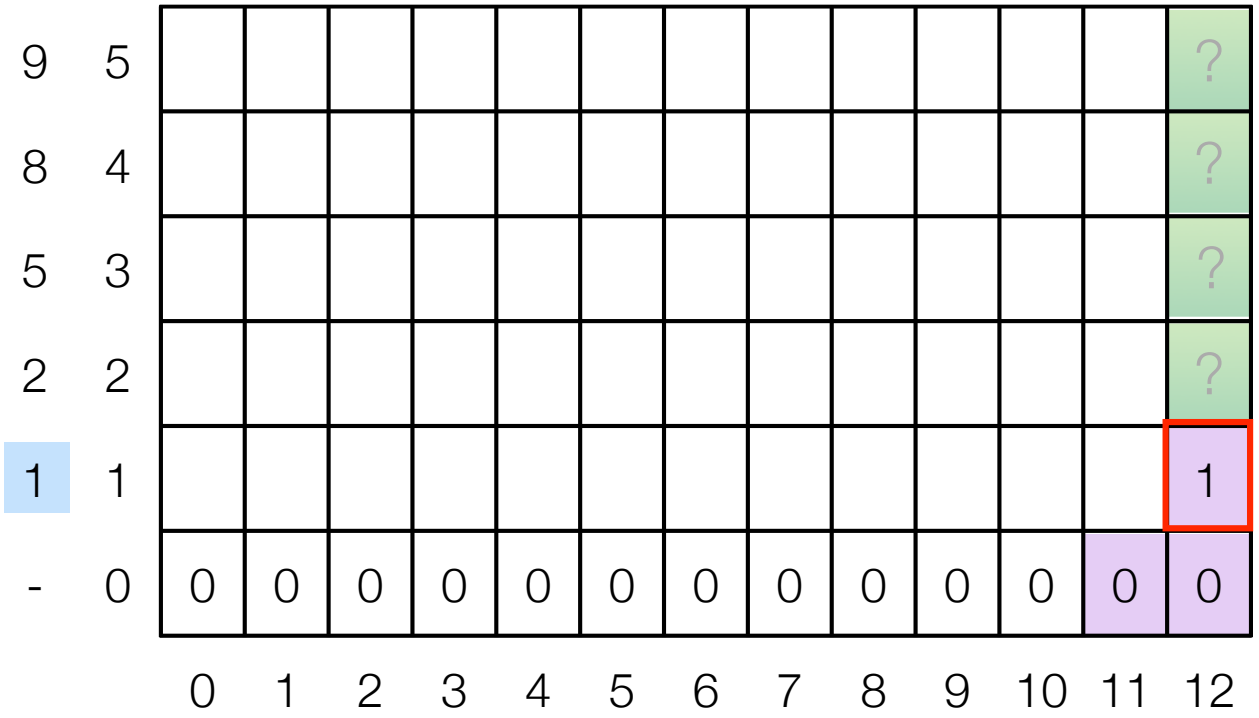

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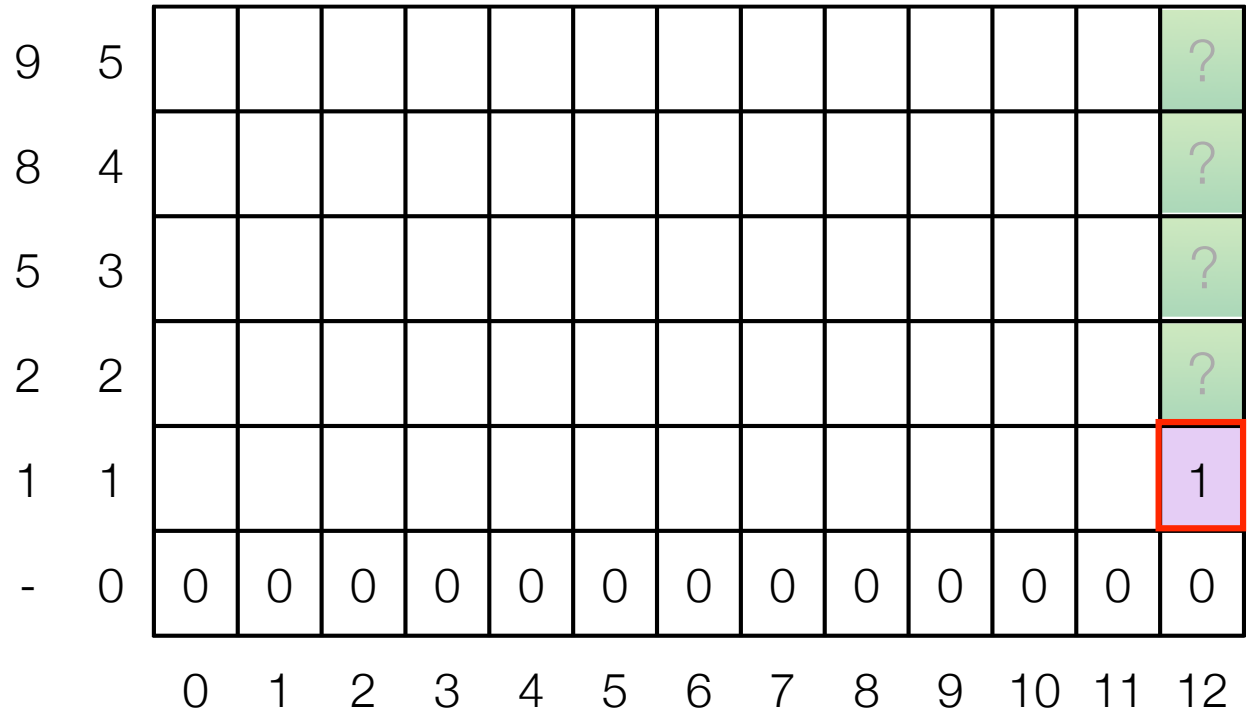

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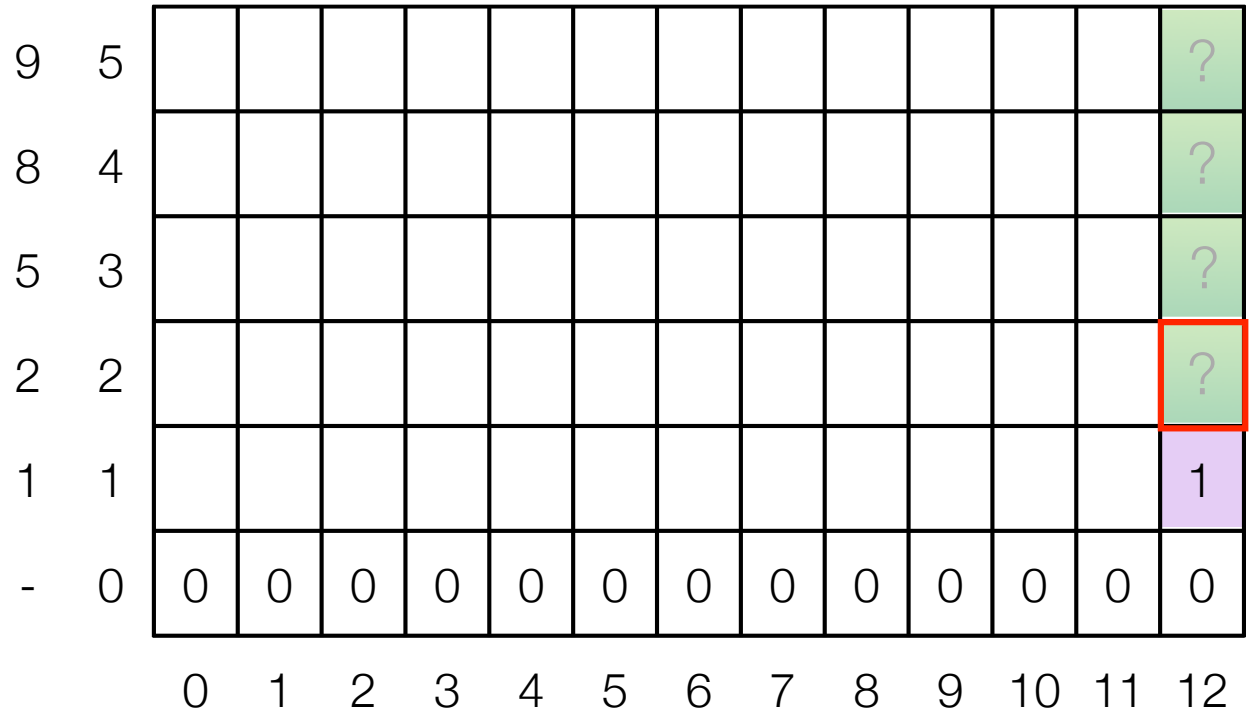

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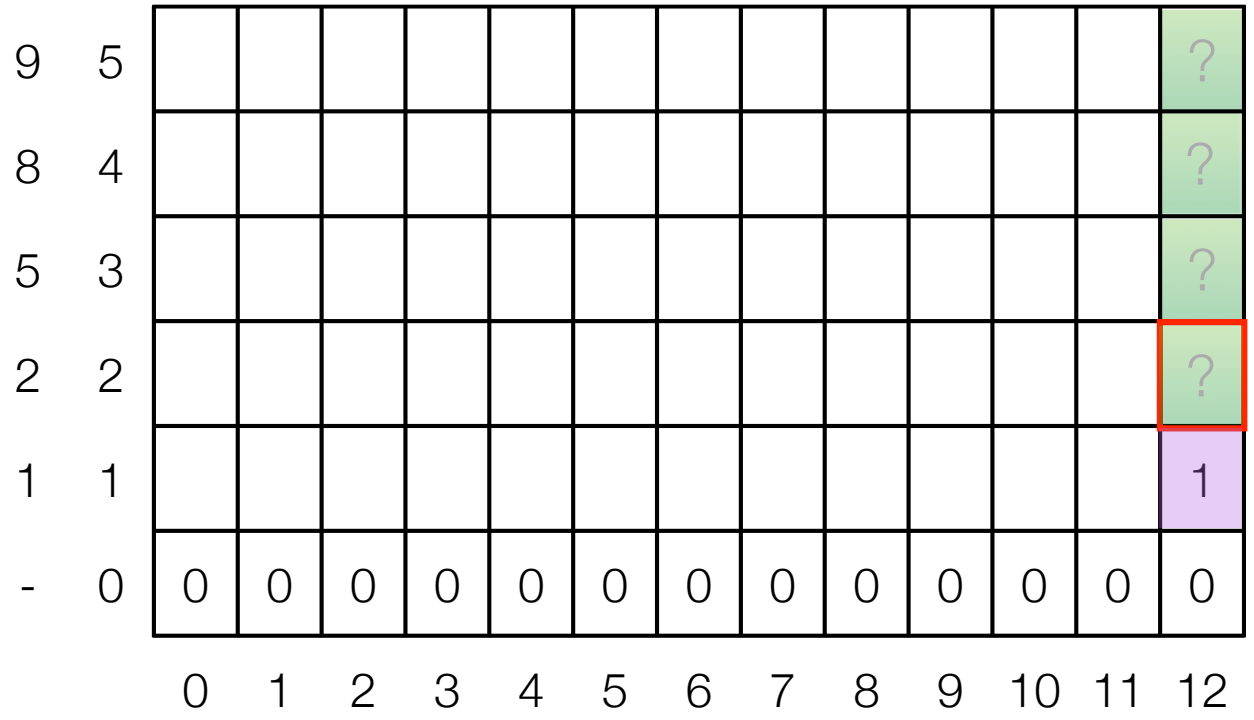

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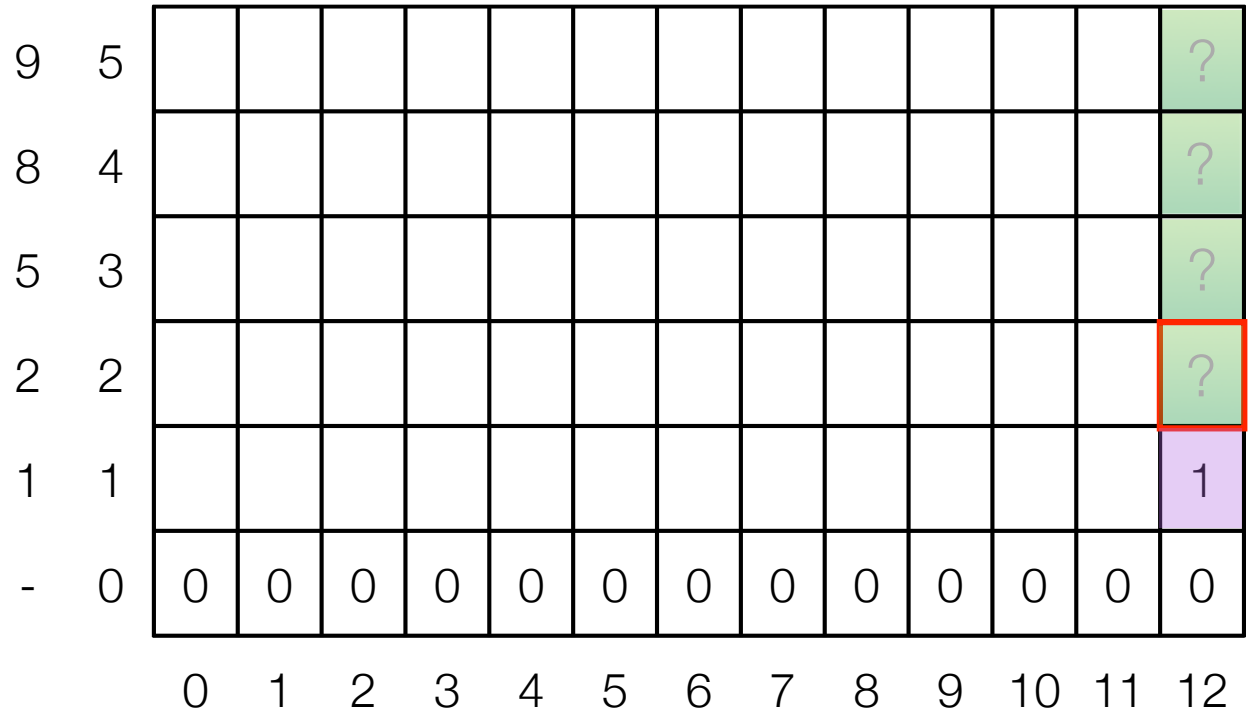

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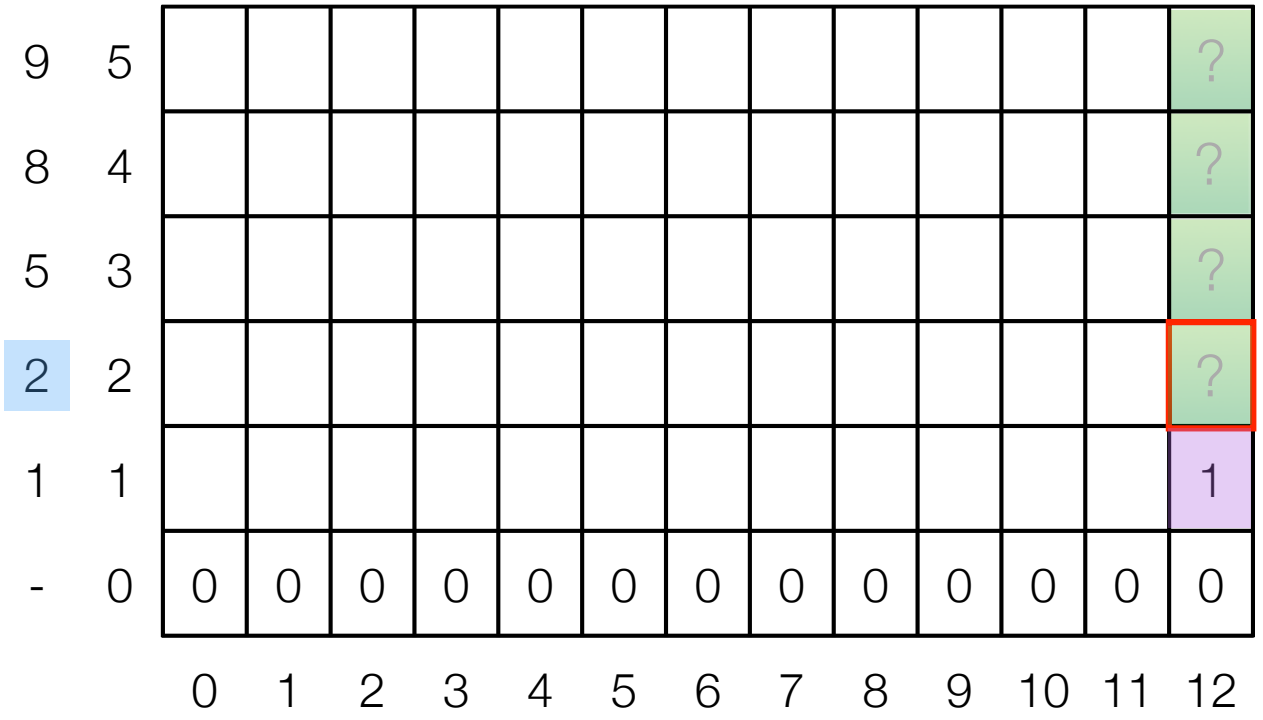

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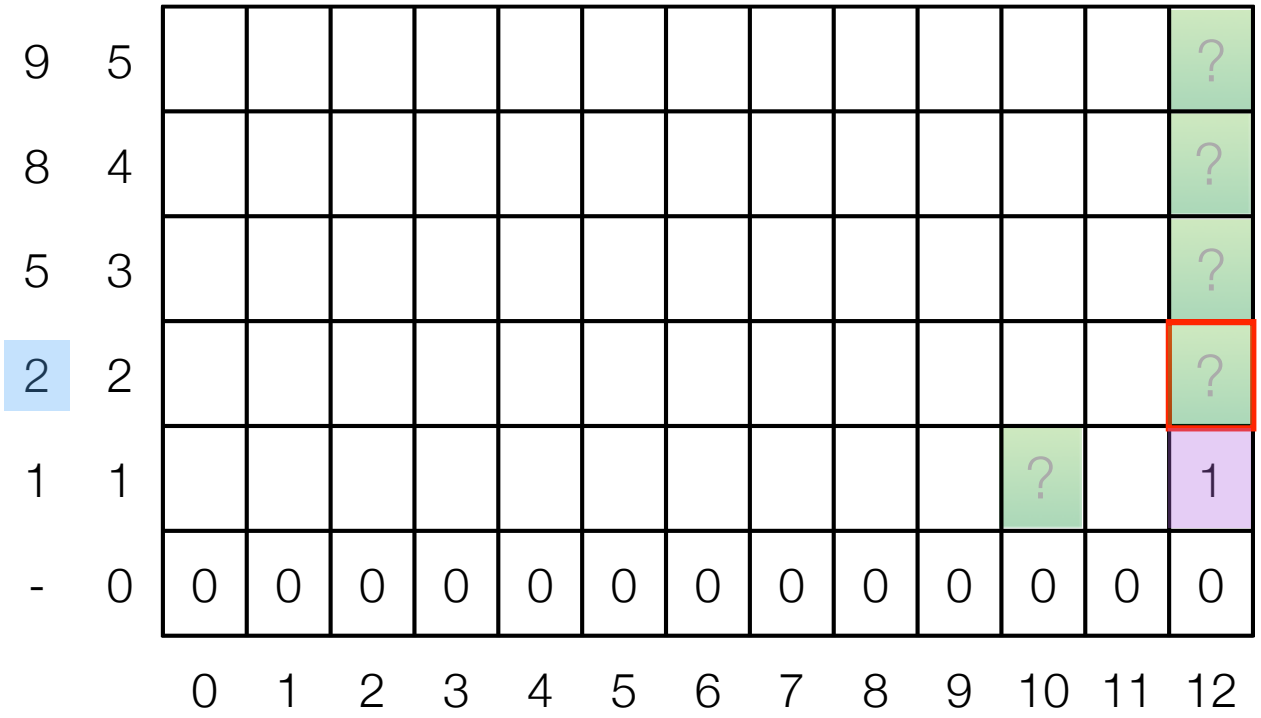

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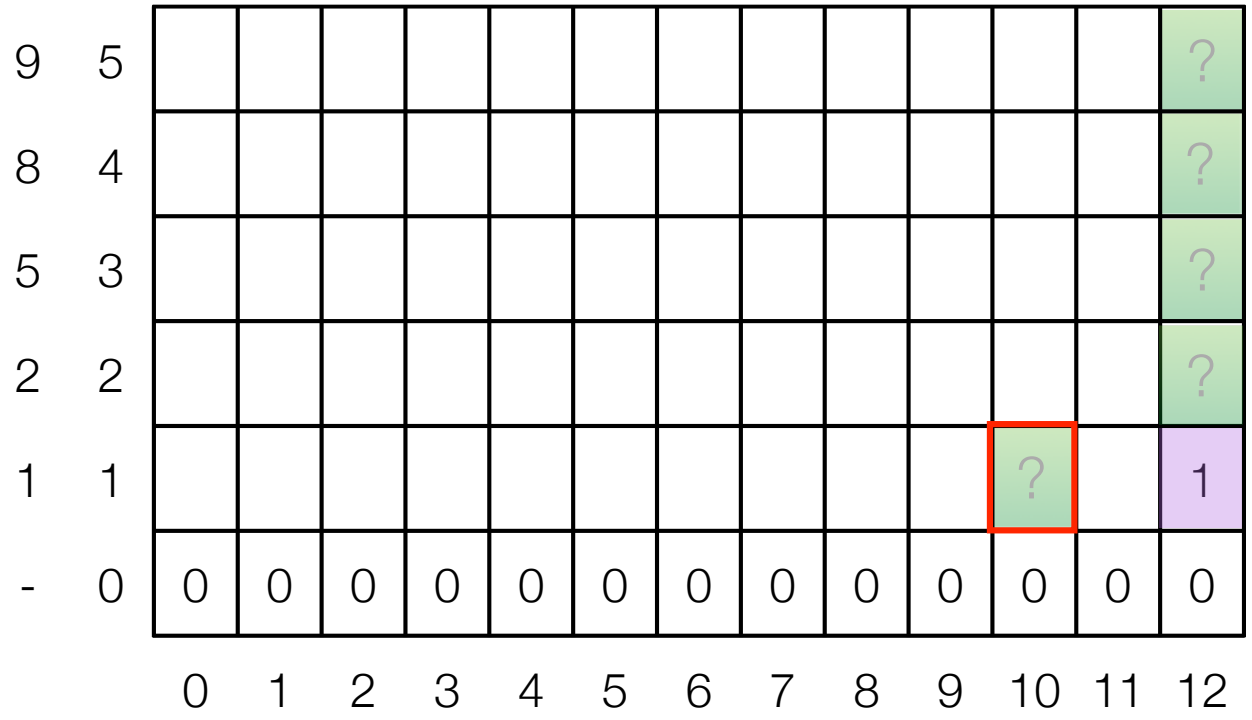

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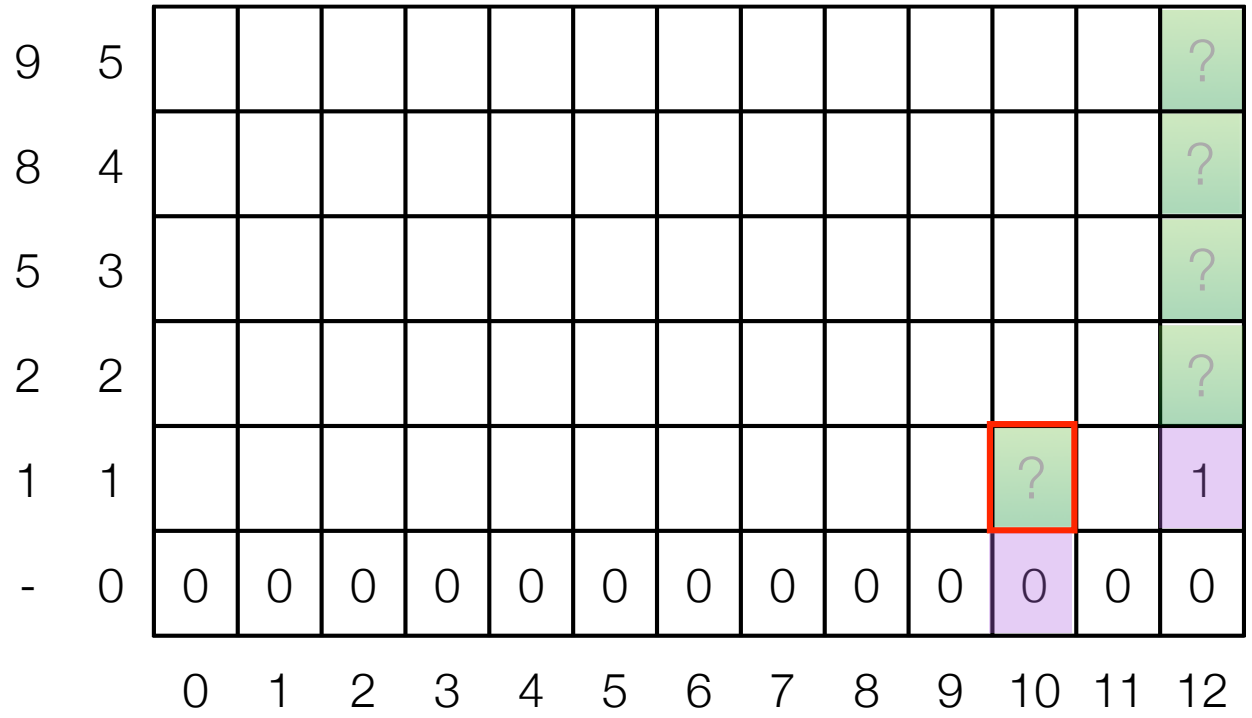

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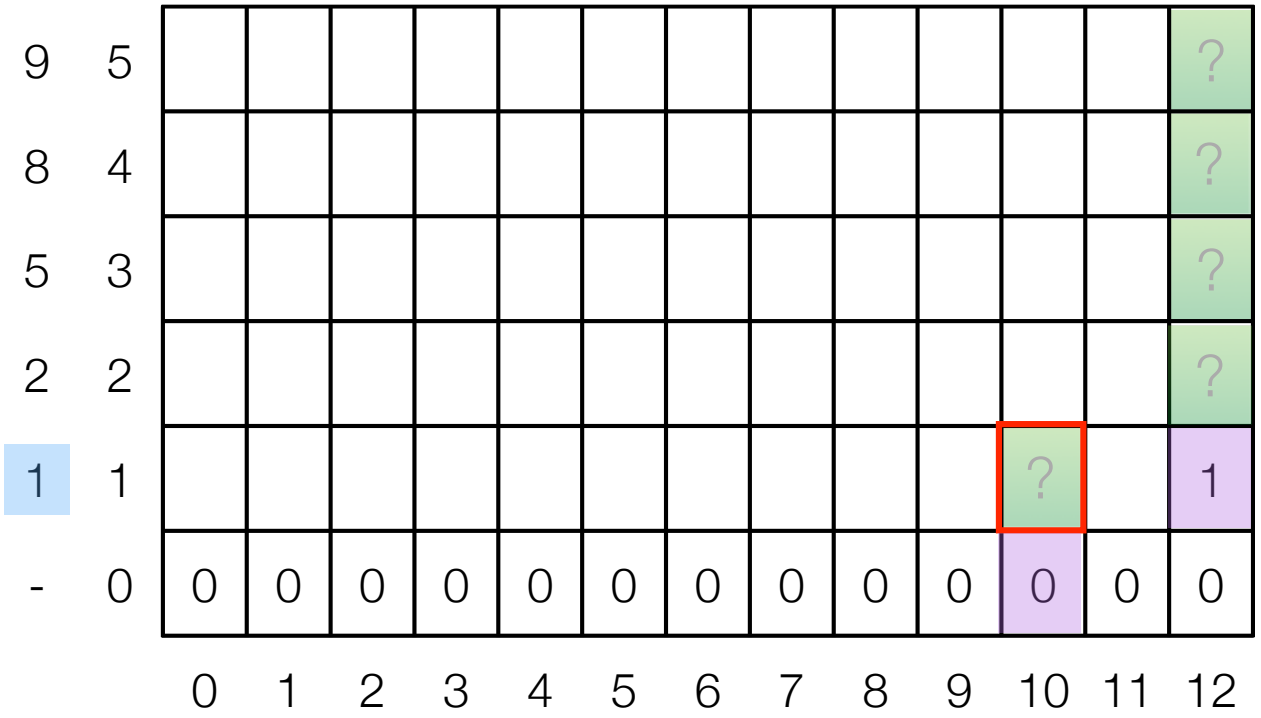

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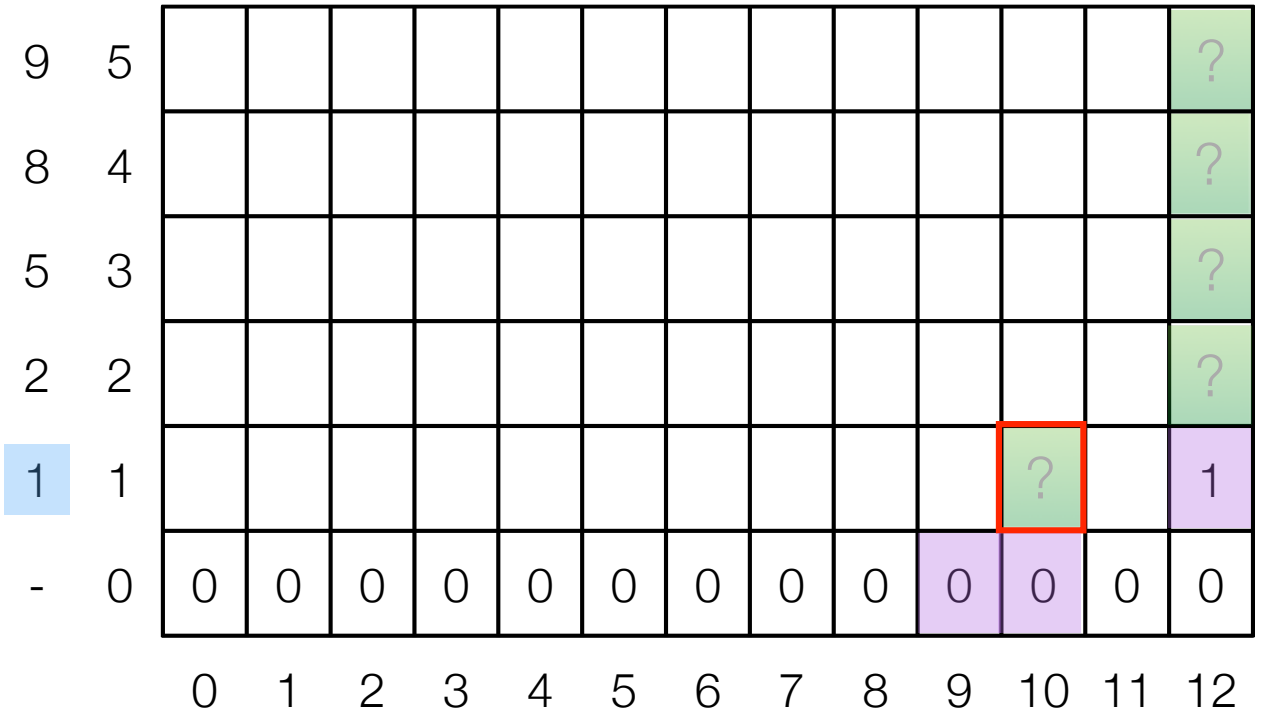

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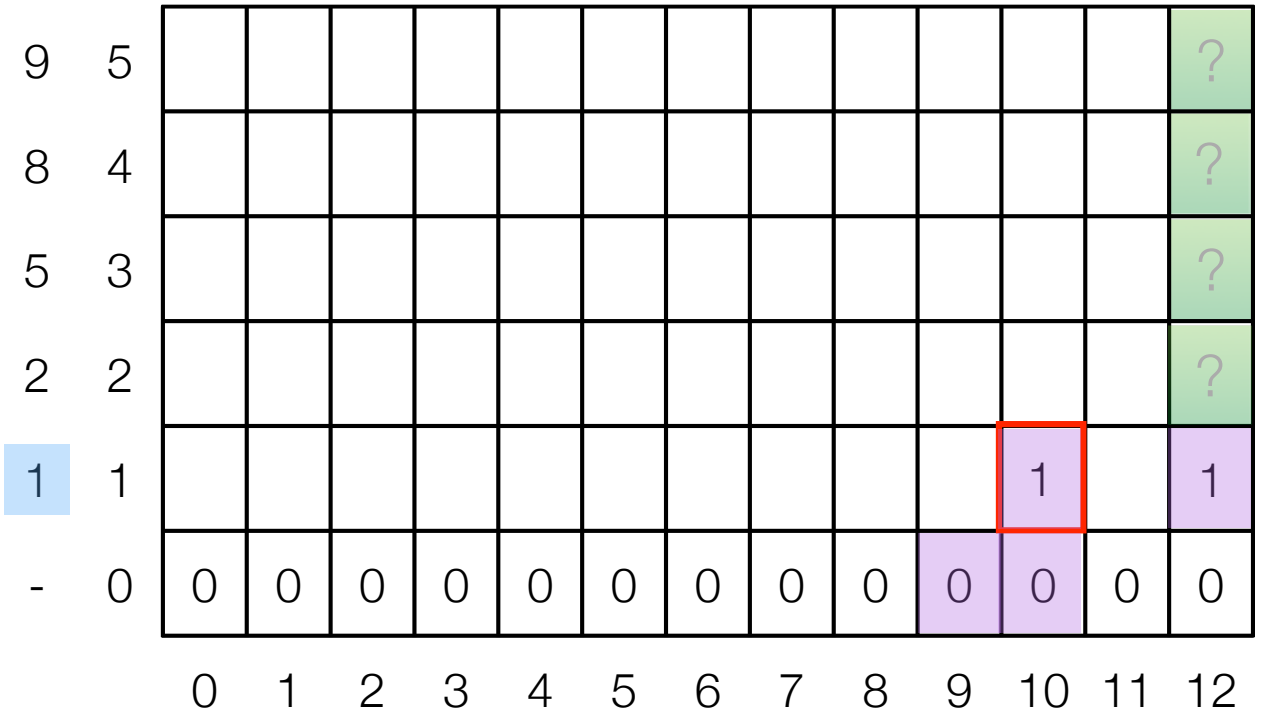

Subset Sum

- Recurrence:

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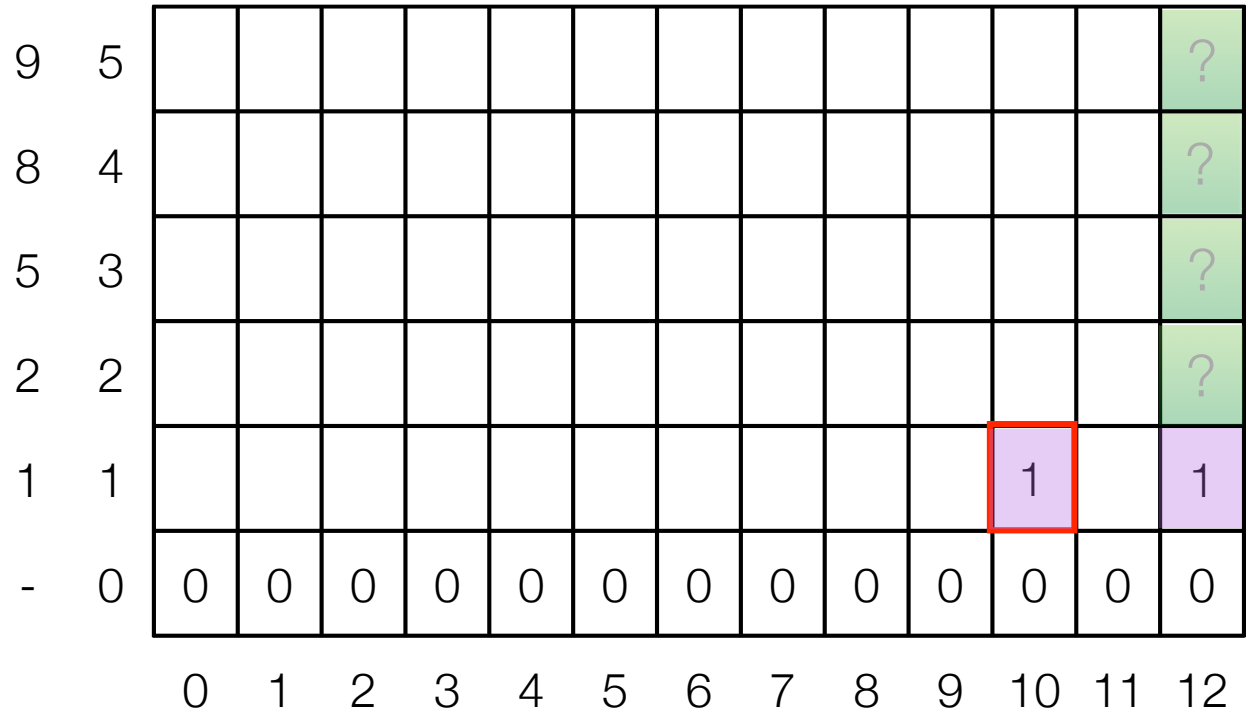

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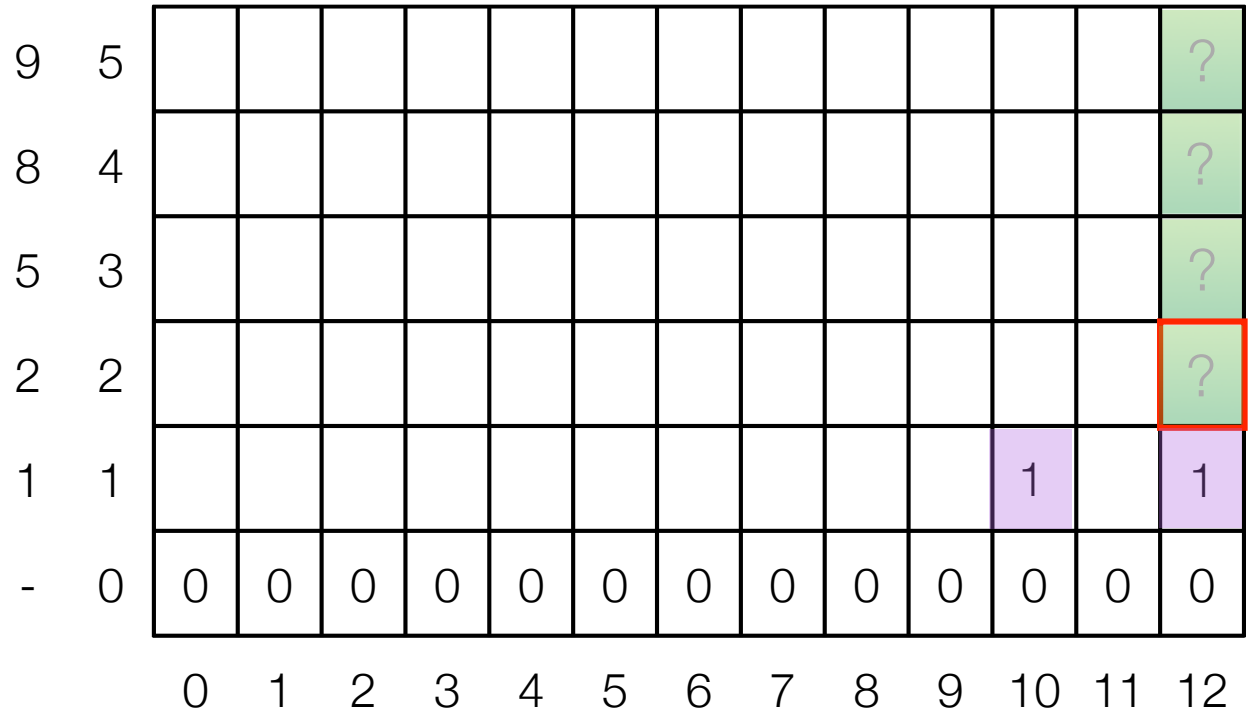

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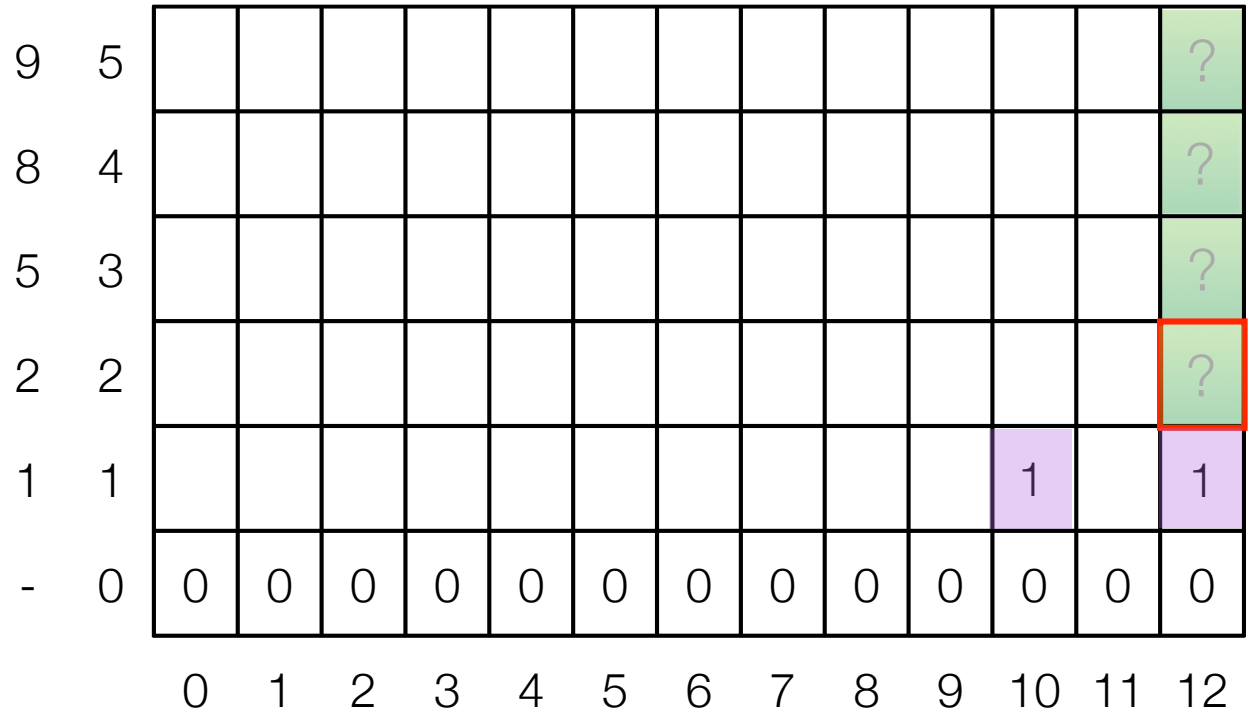

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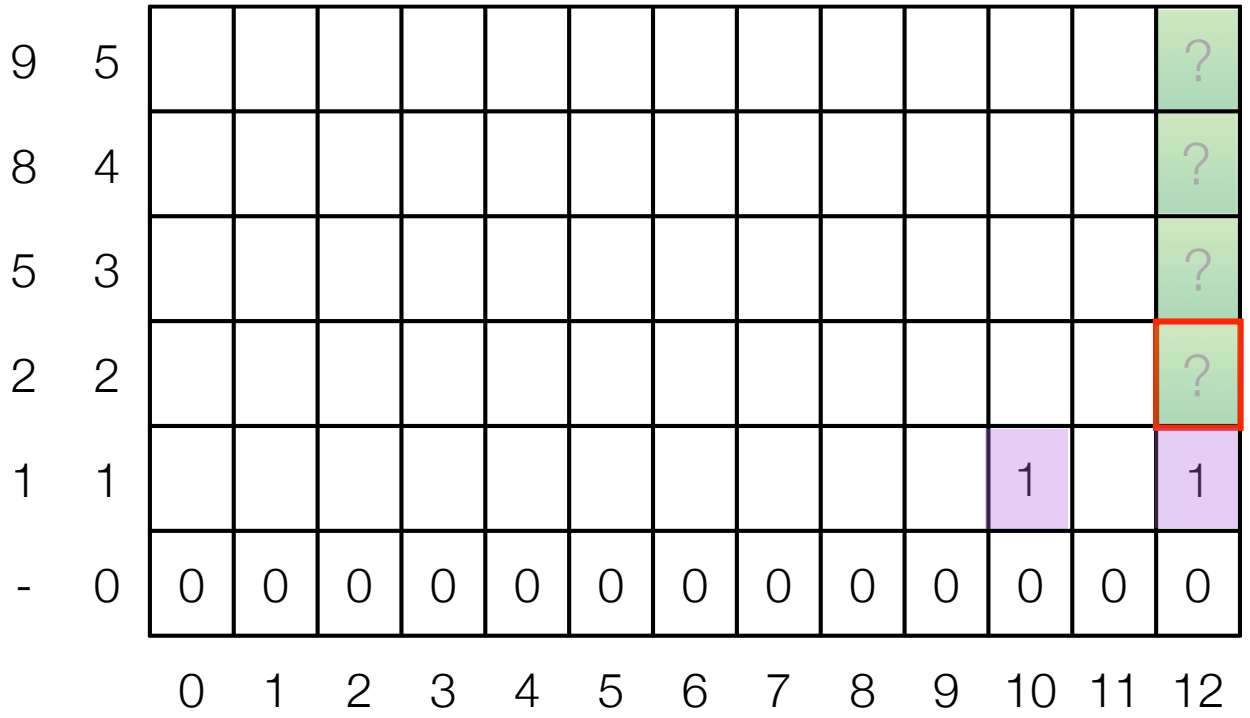

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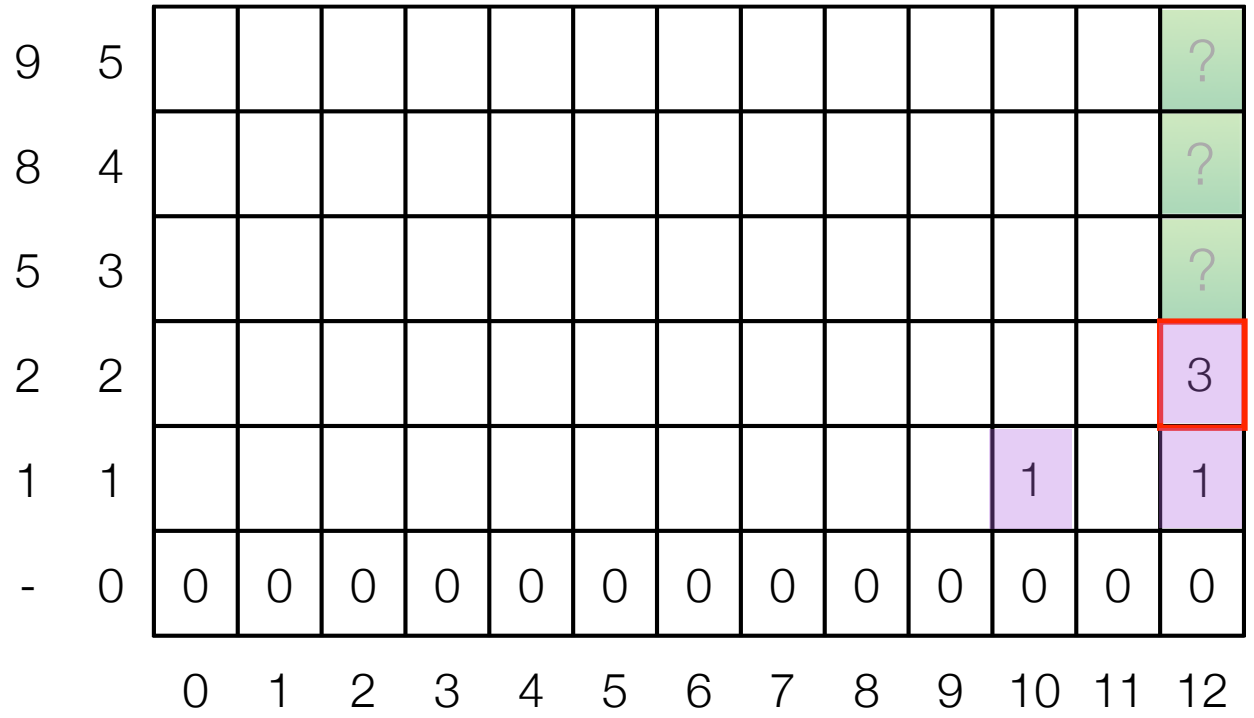

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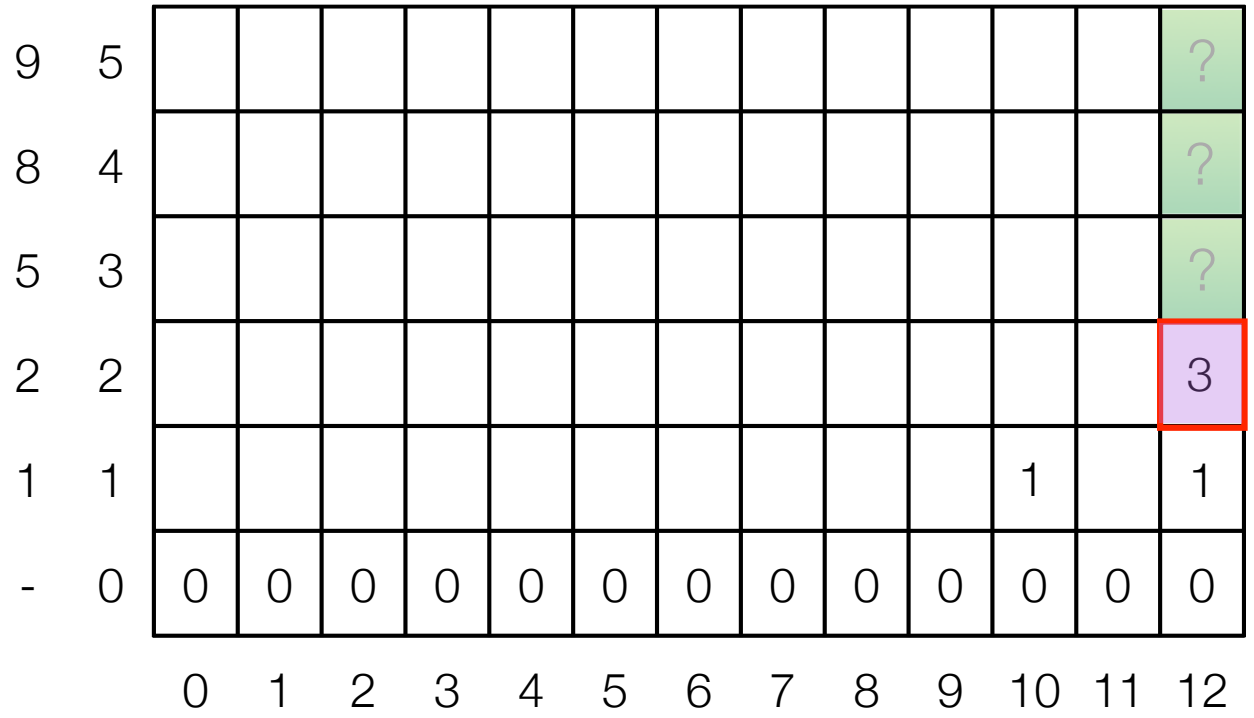

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- Example
  - {1, 2, 5, 8, 9} and W = 12

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

Subset Sum

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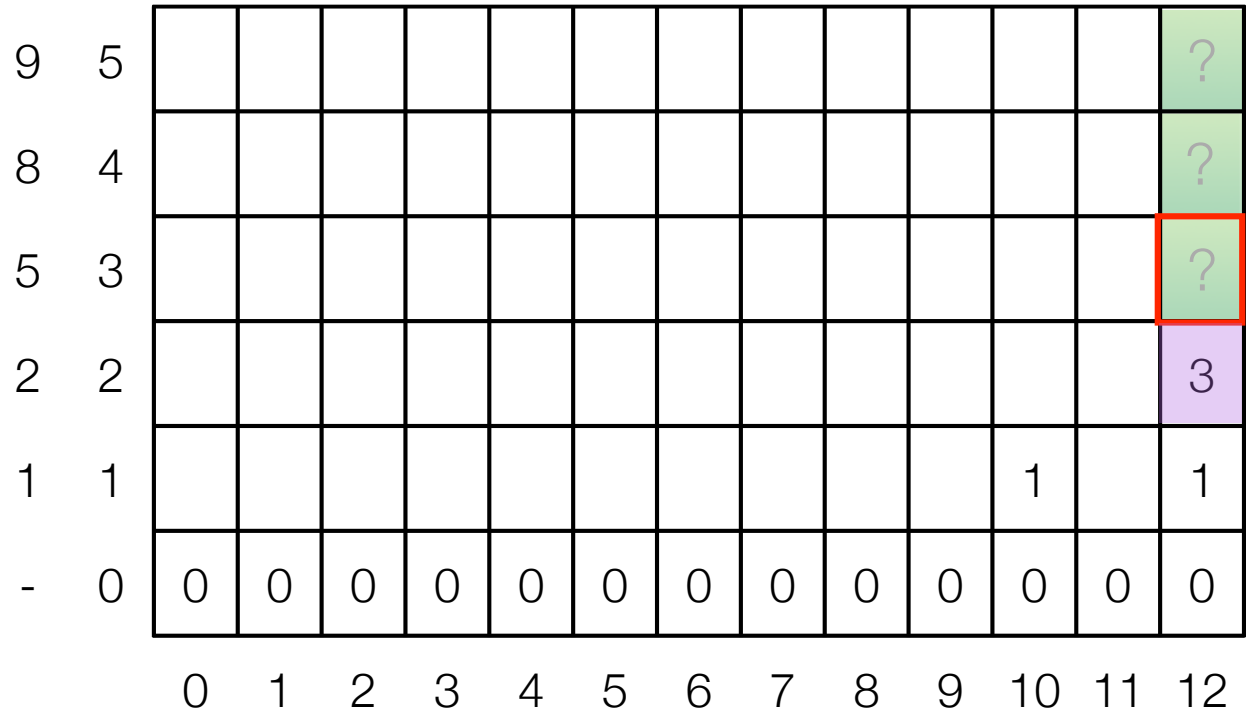

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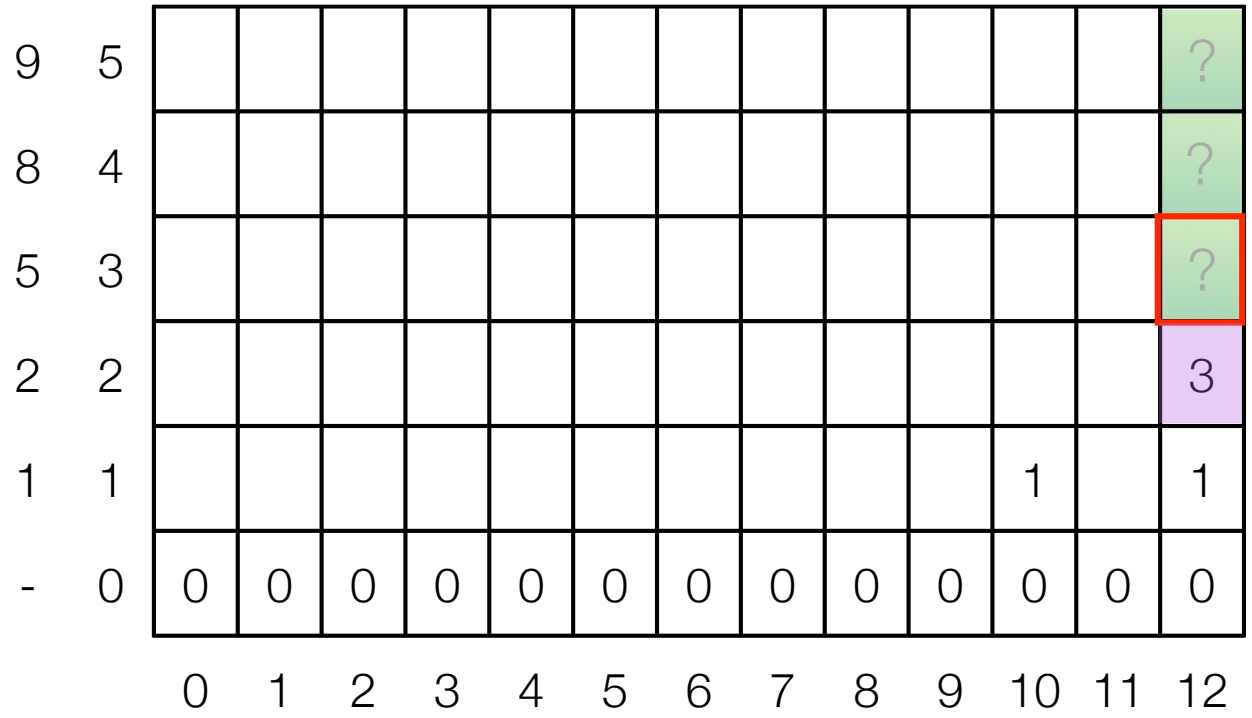

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-	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	1	2	3	4	5	6	7	8	9	10	11	12

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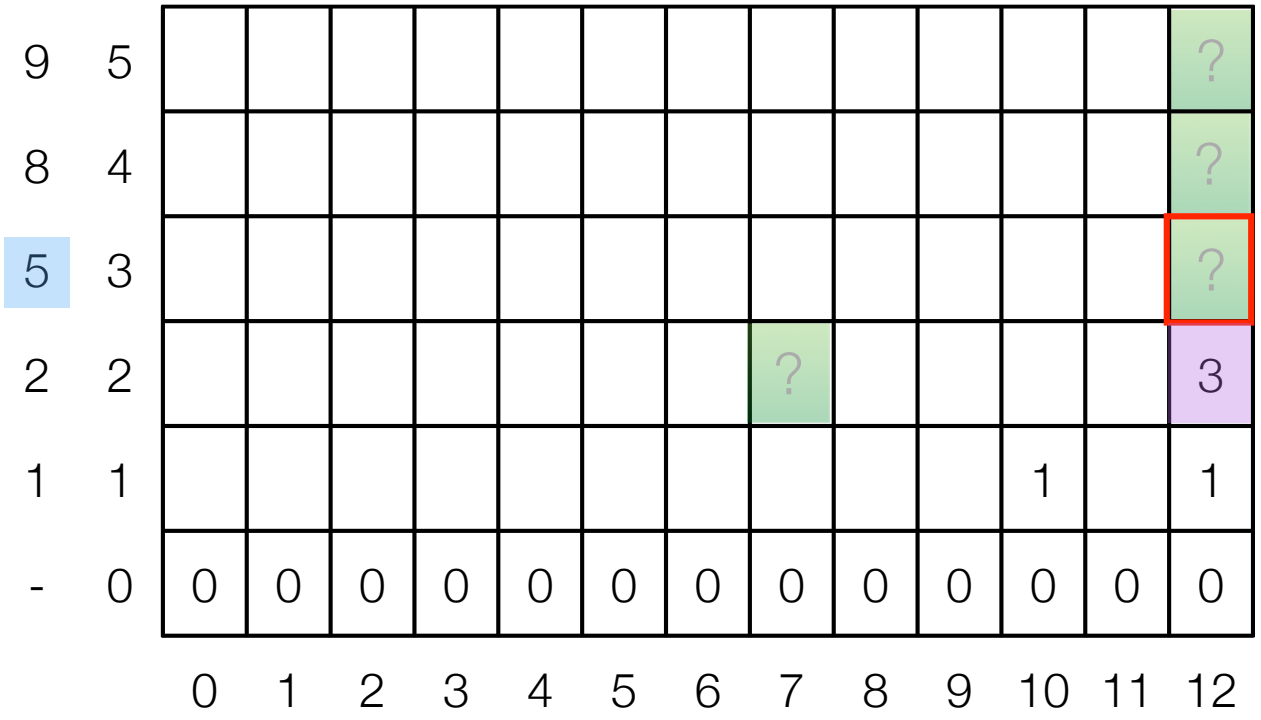

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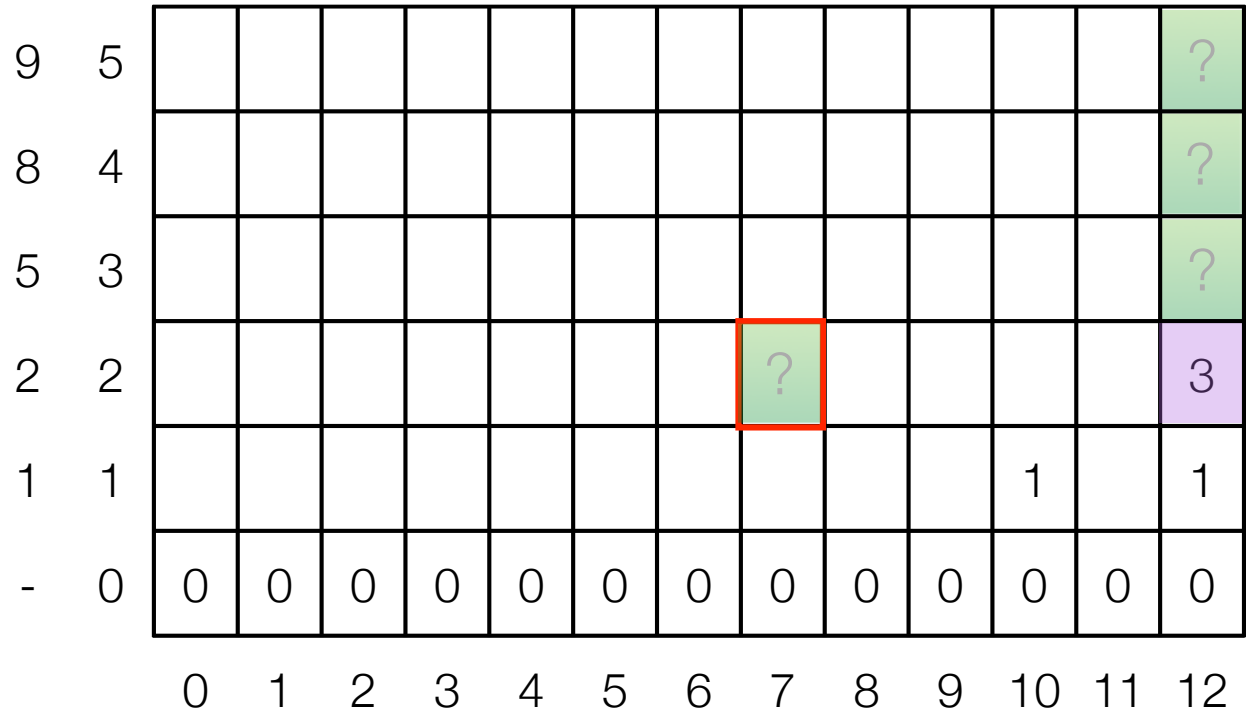

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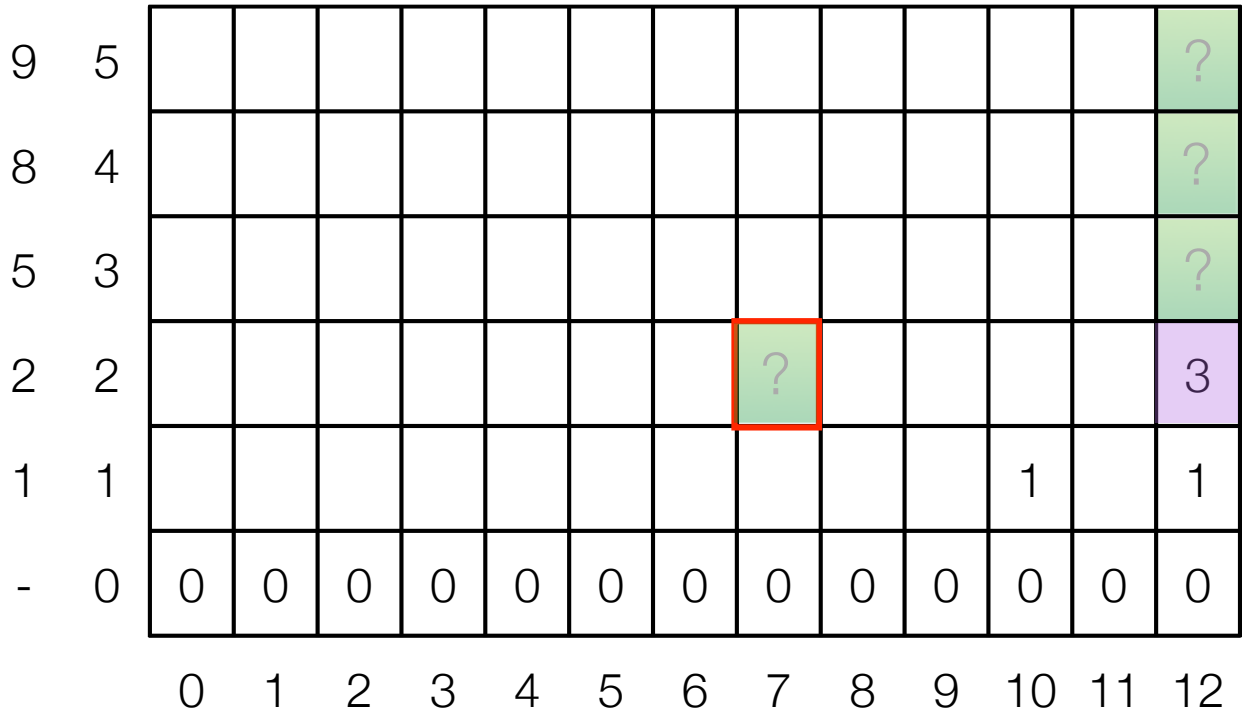

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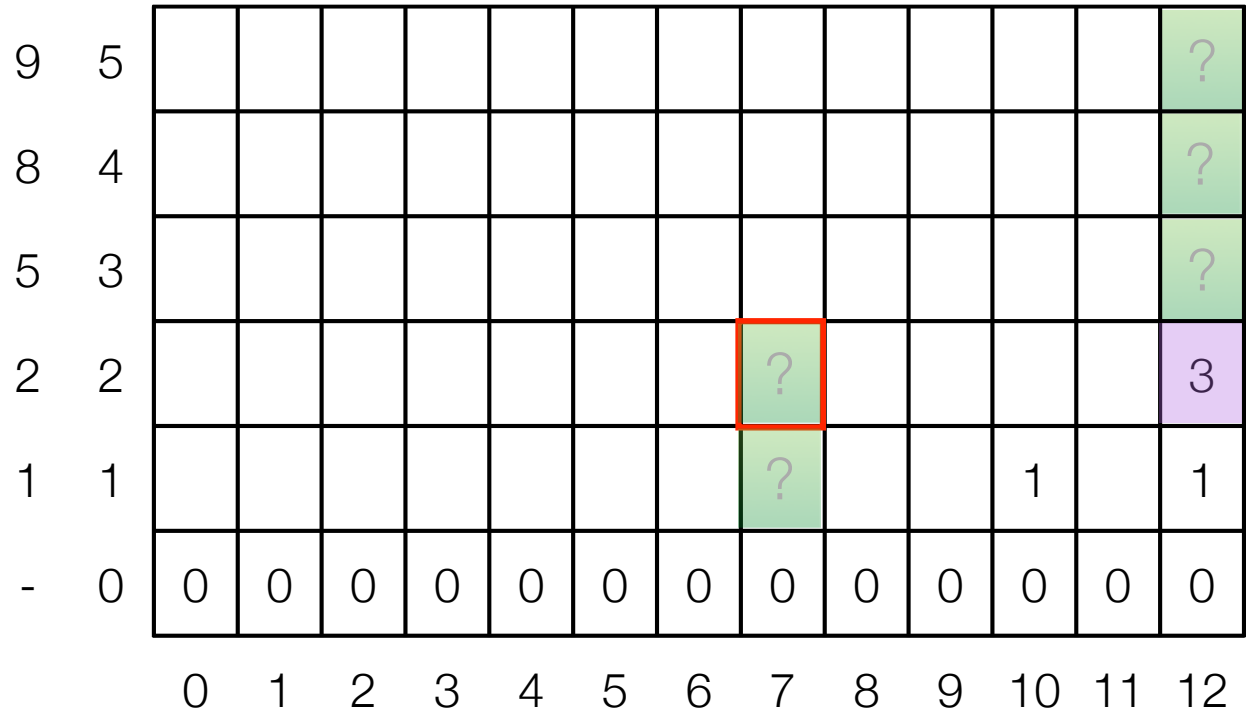

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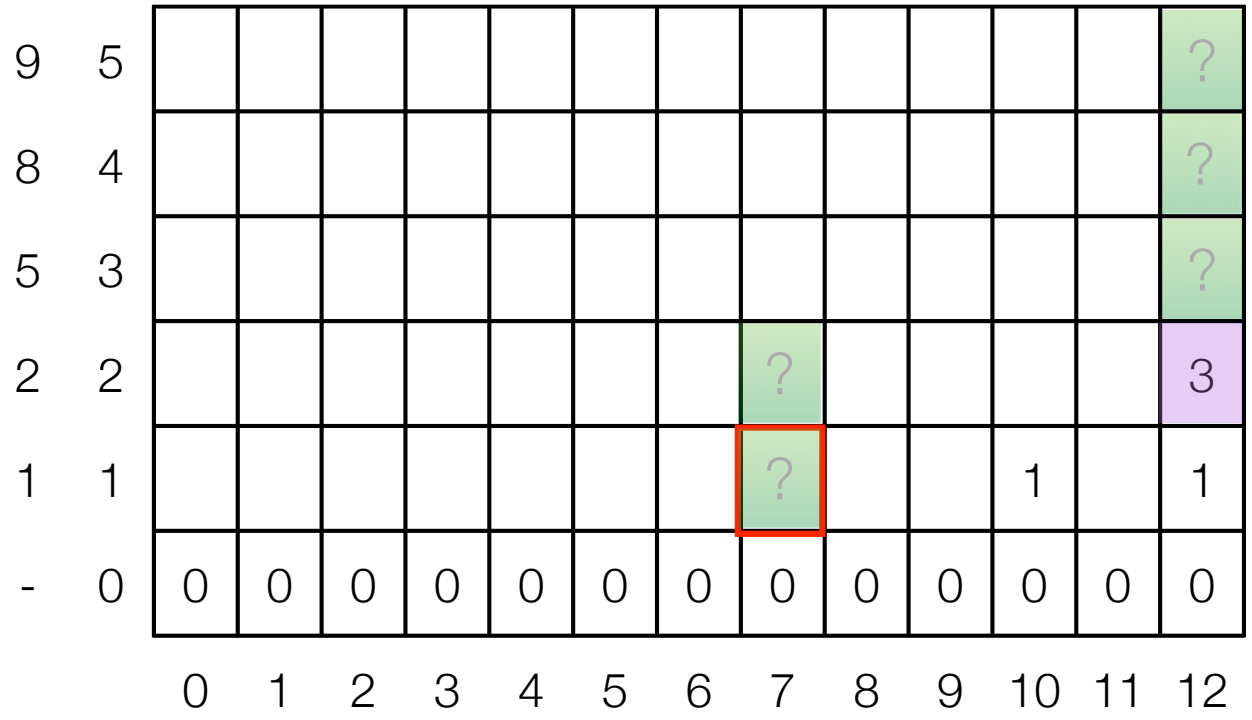

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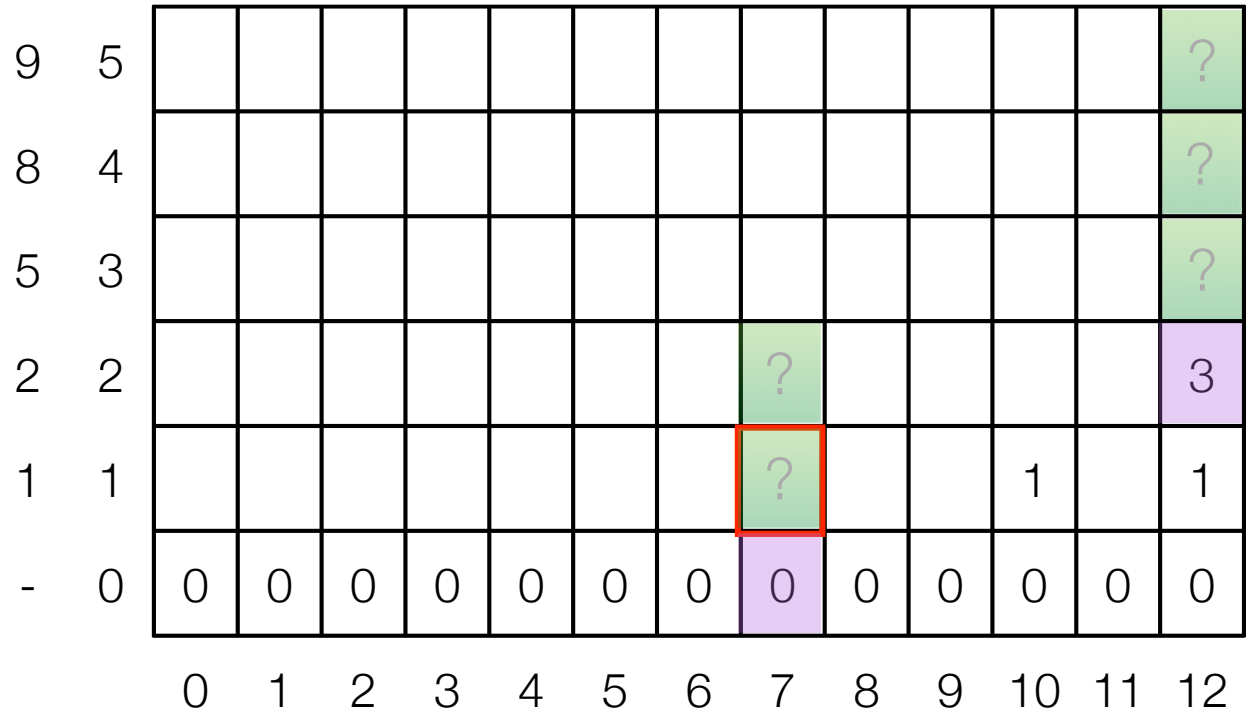

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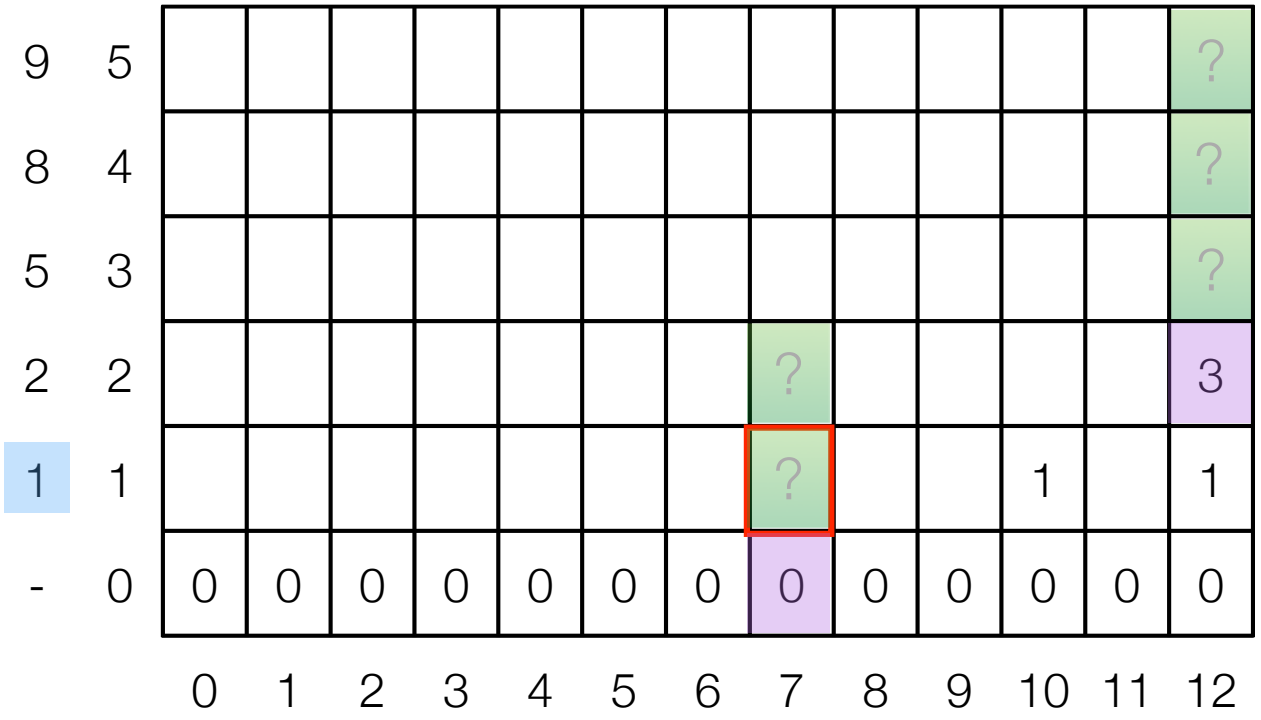

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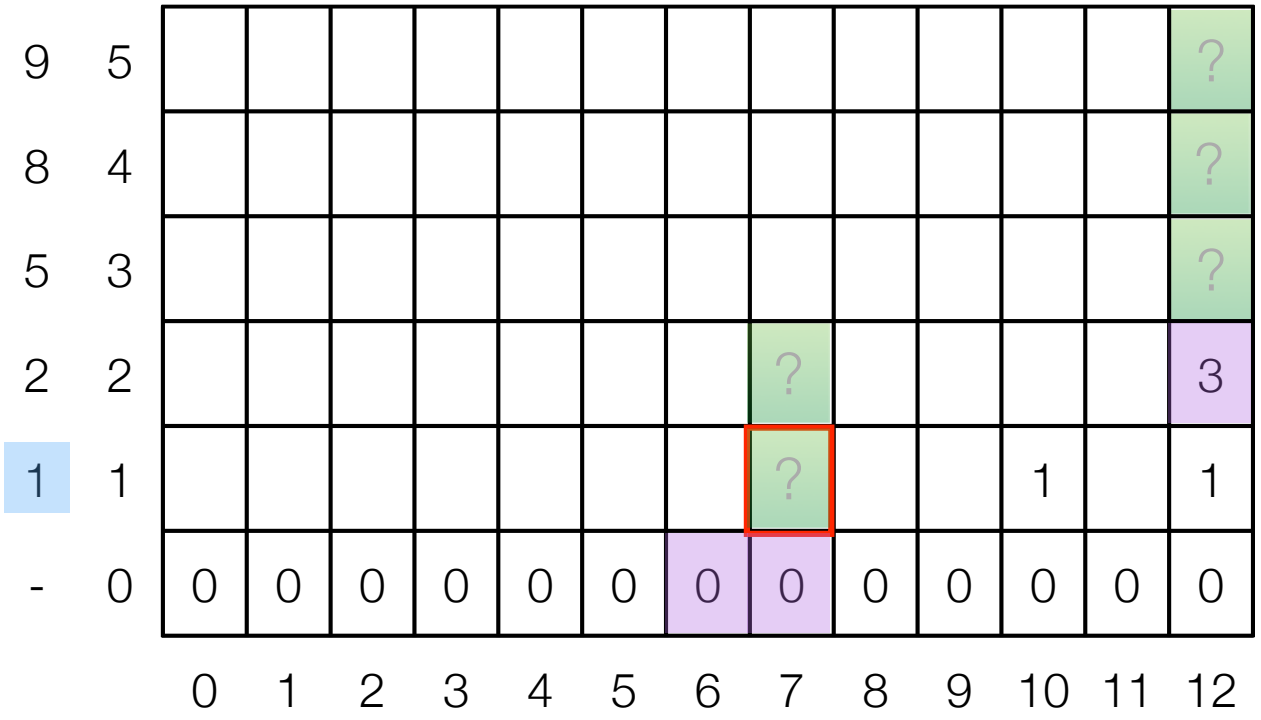

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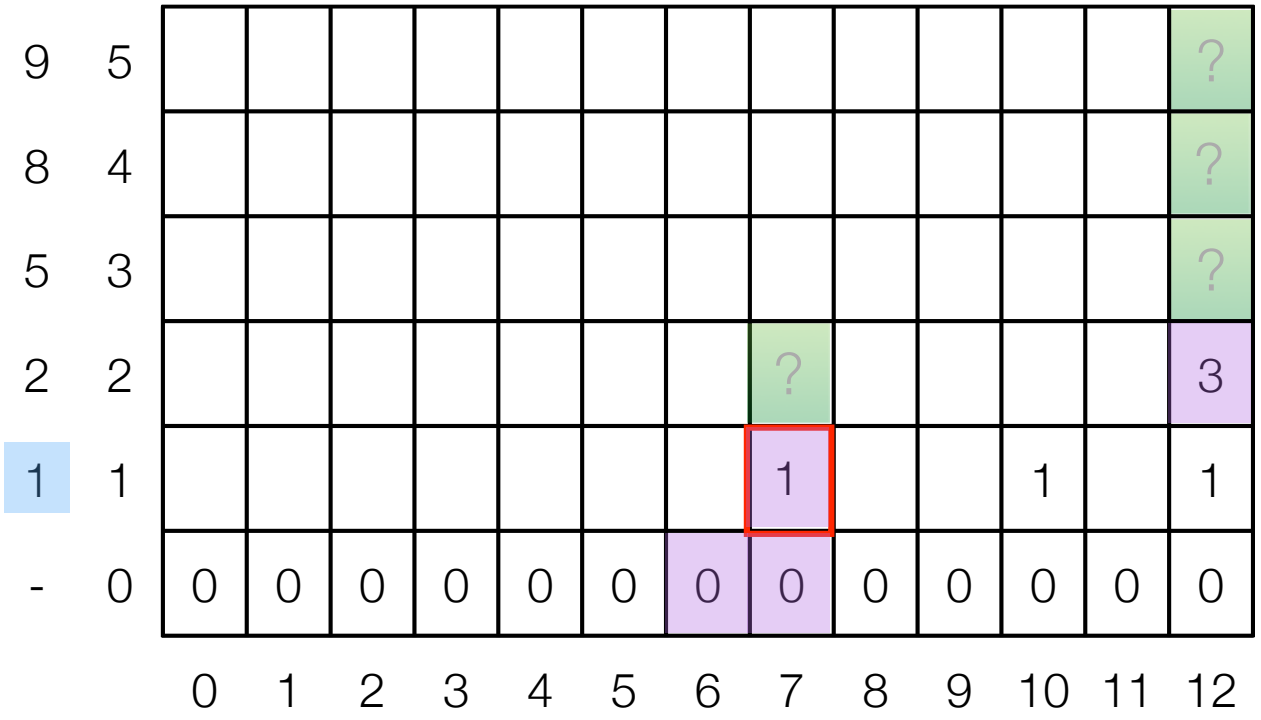

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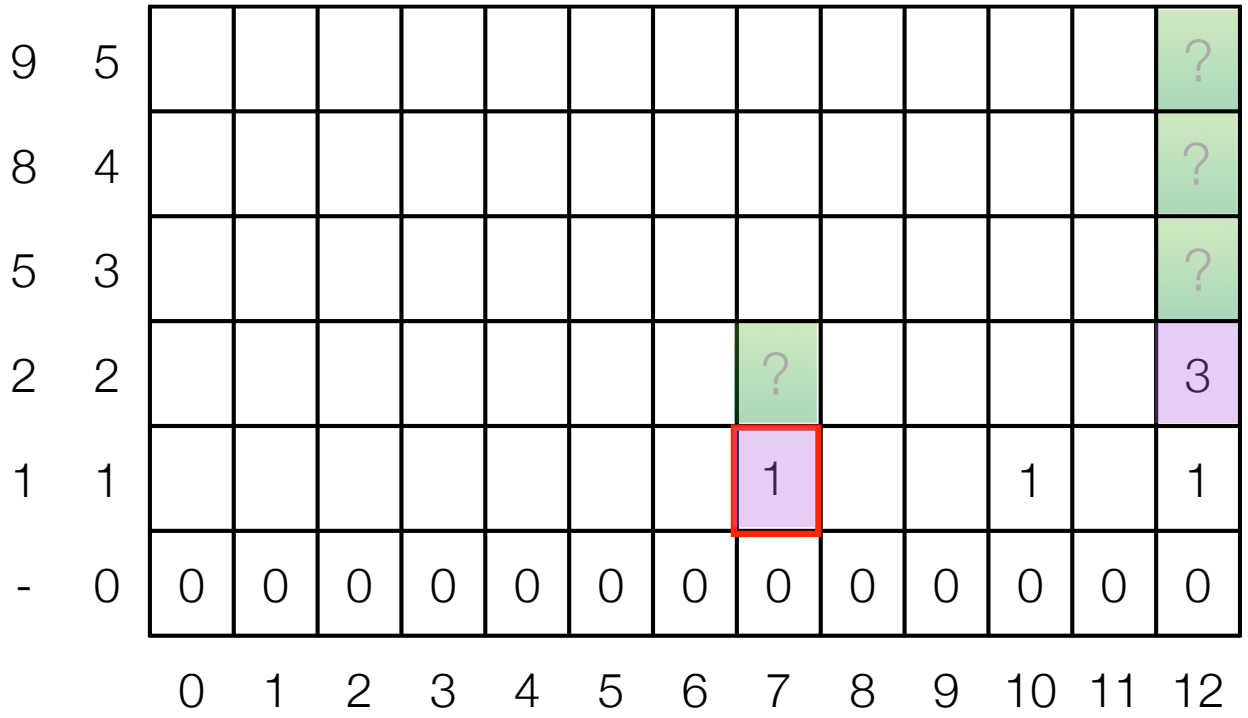

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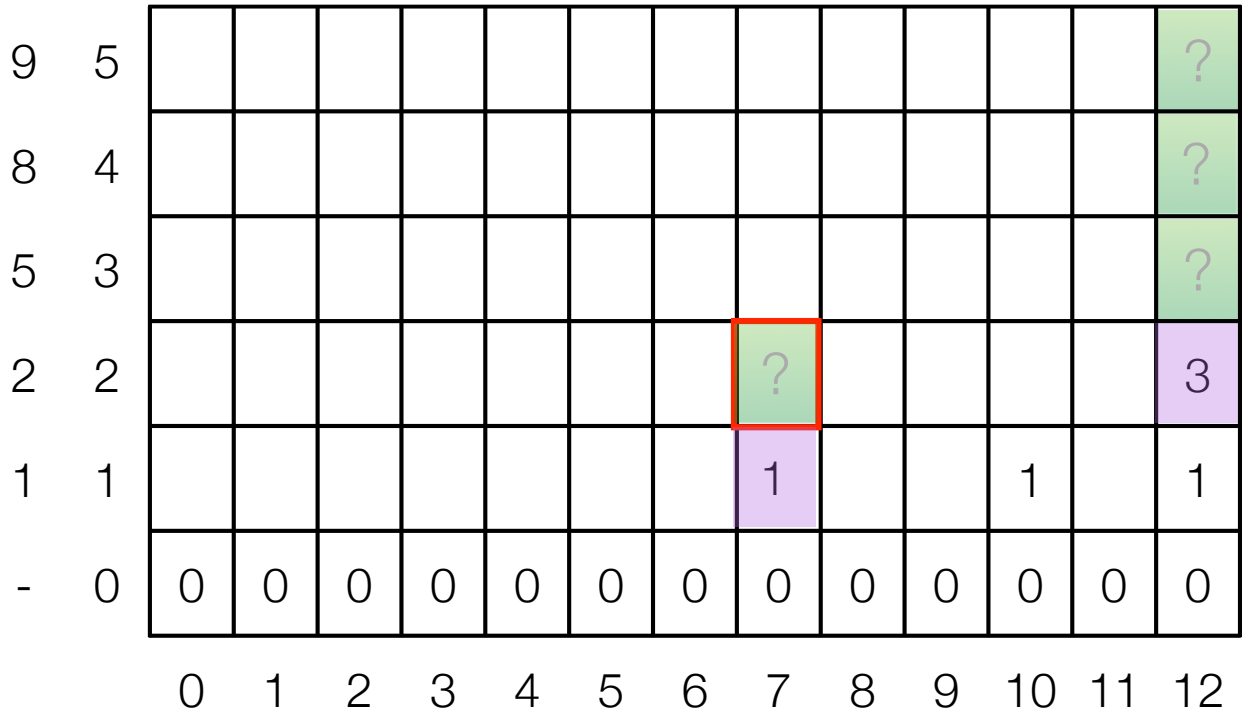

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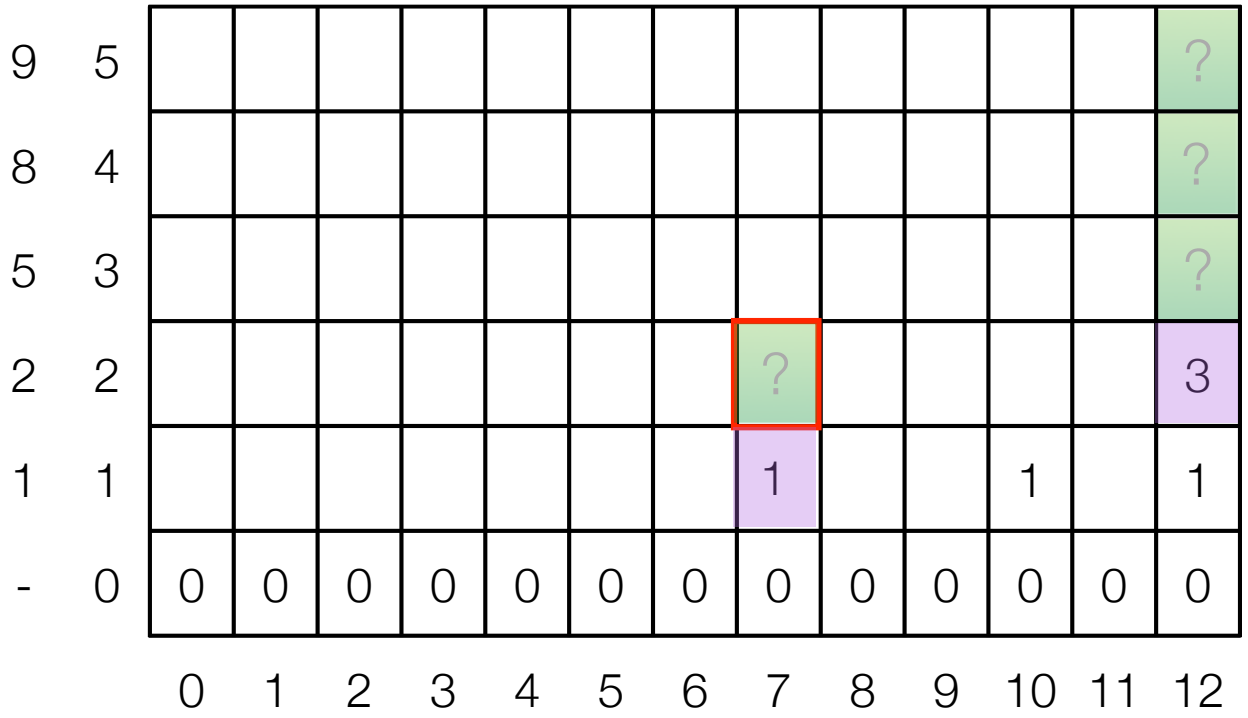

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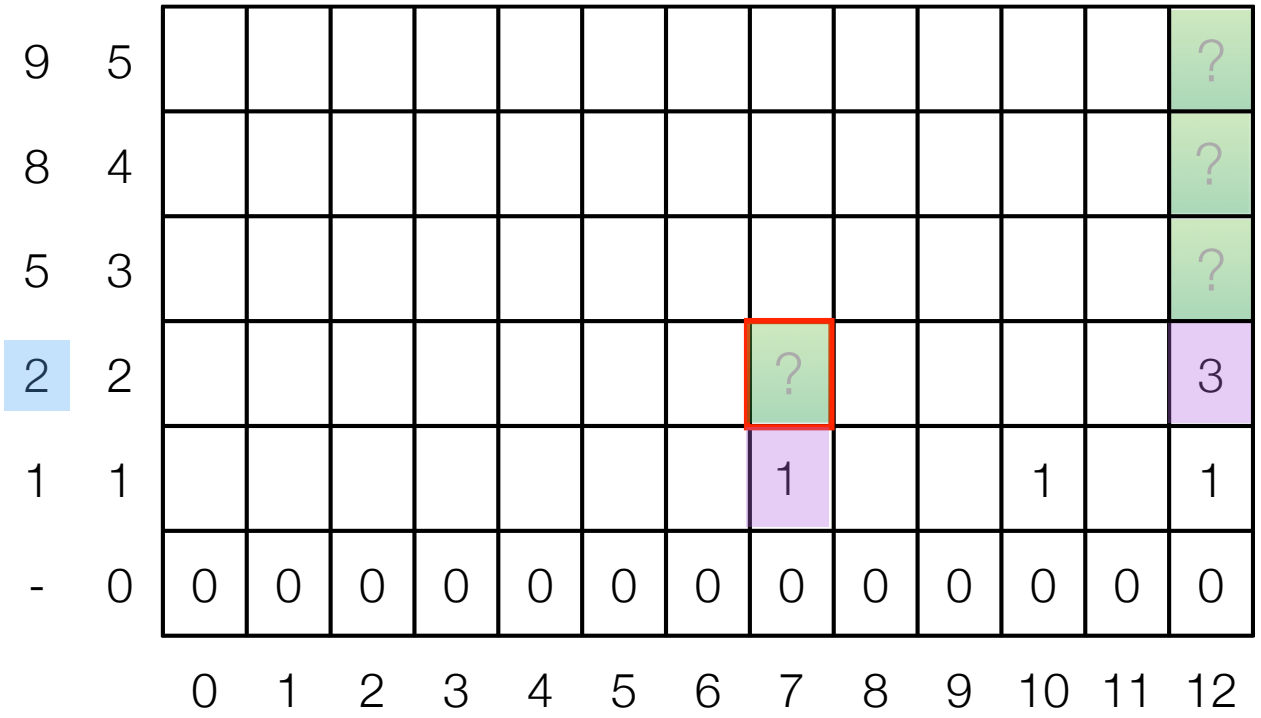

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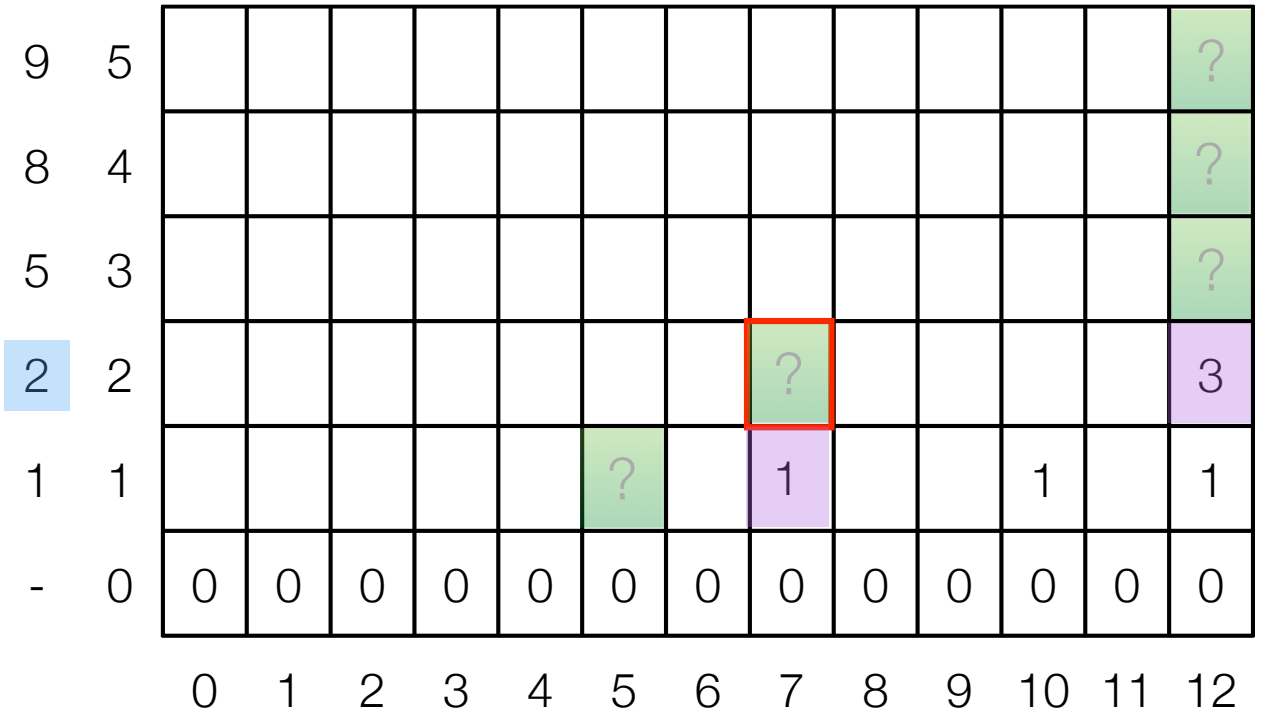

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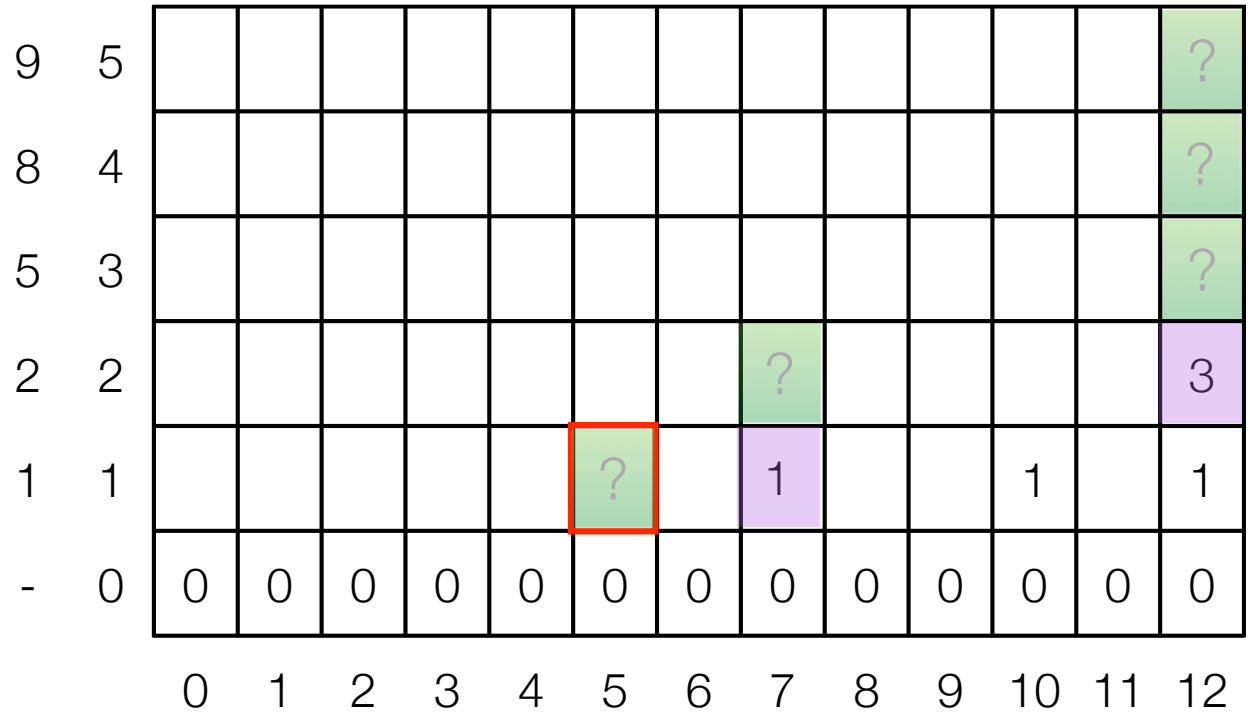

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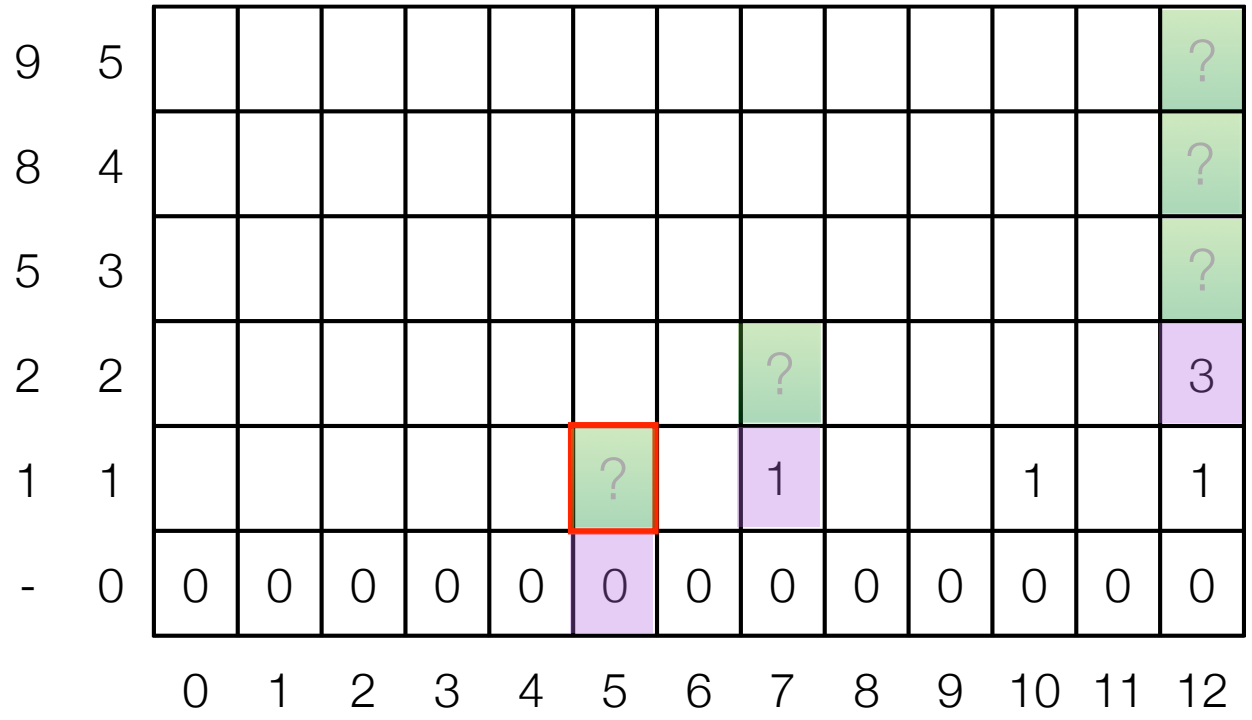

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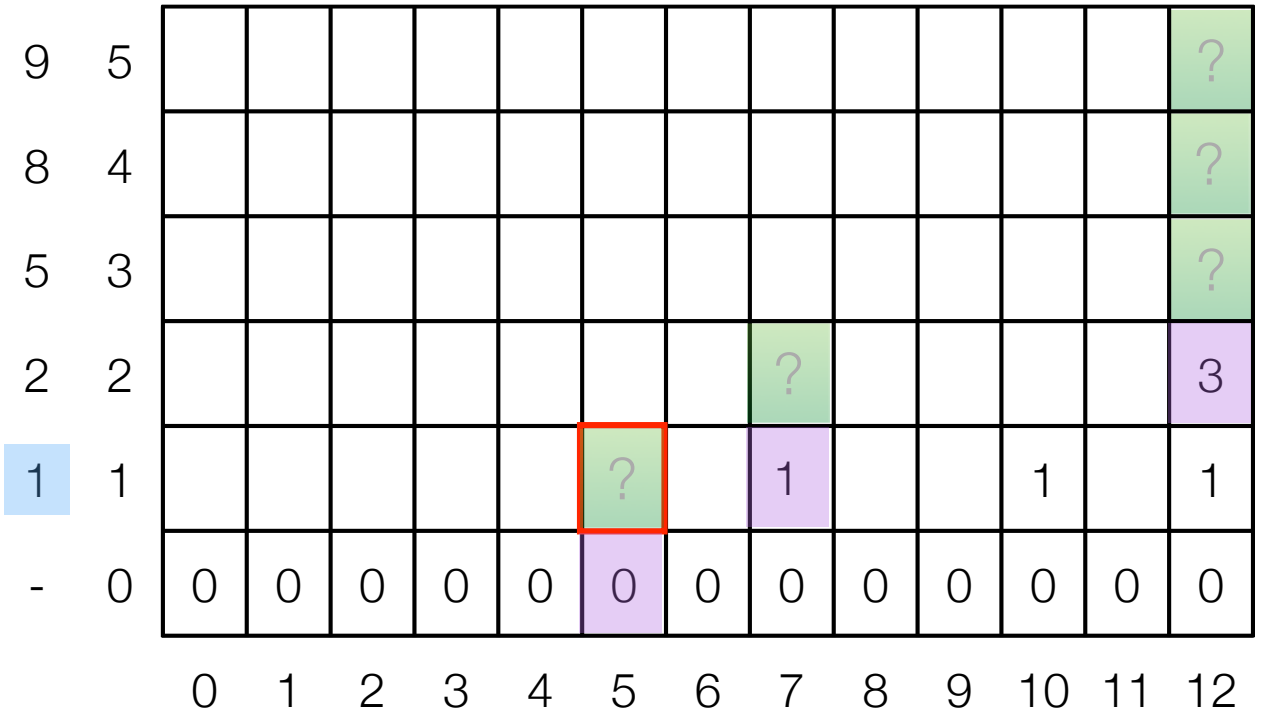

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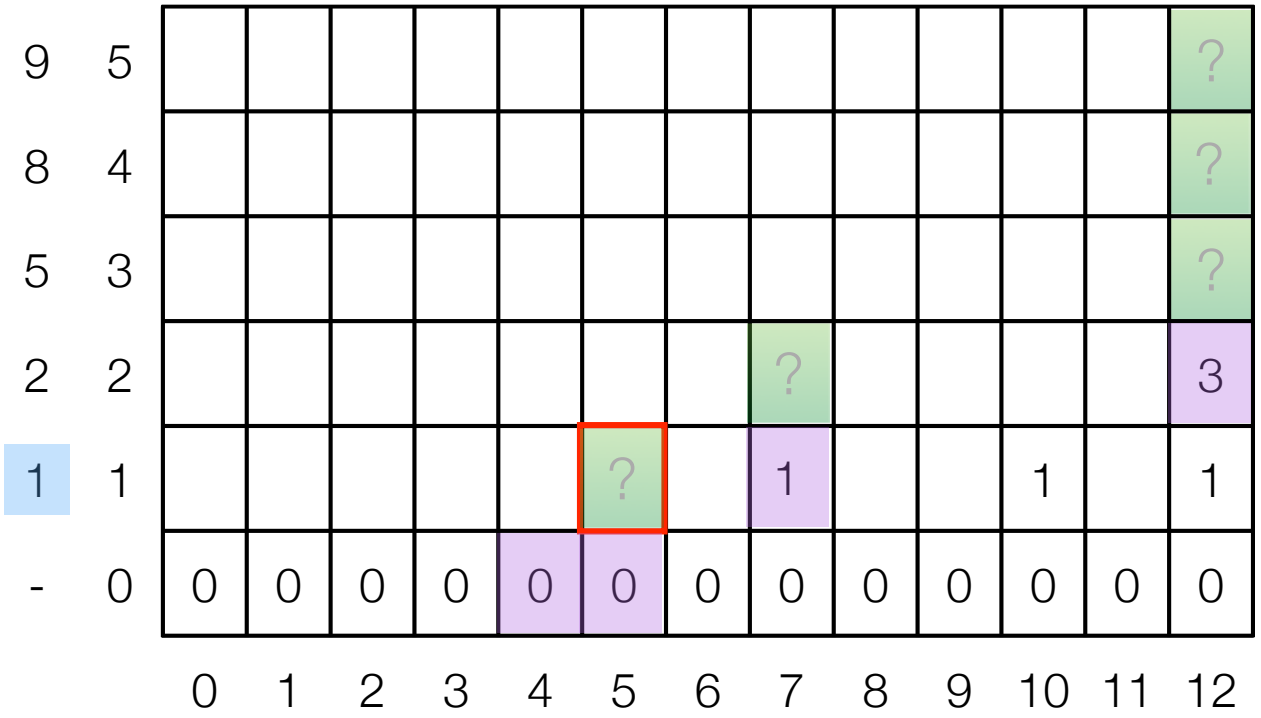

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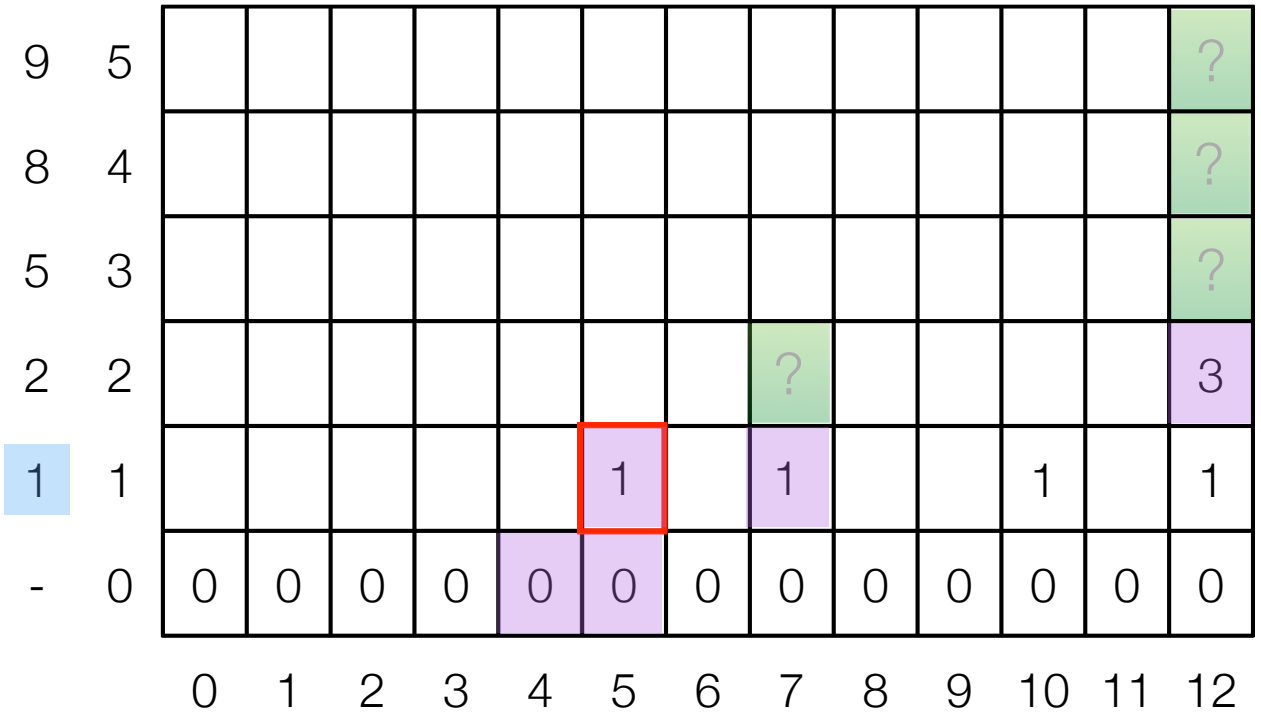

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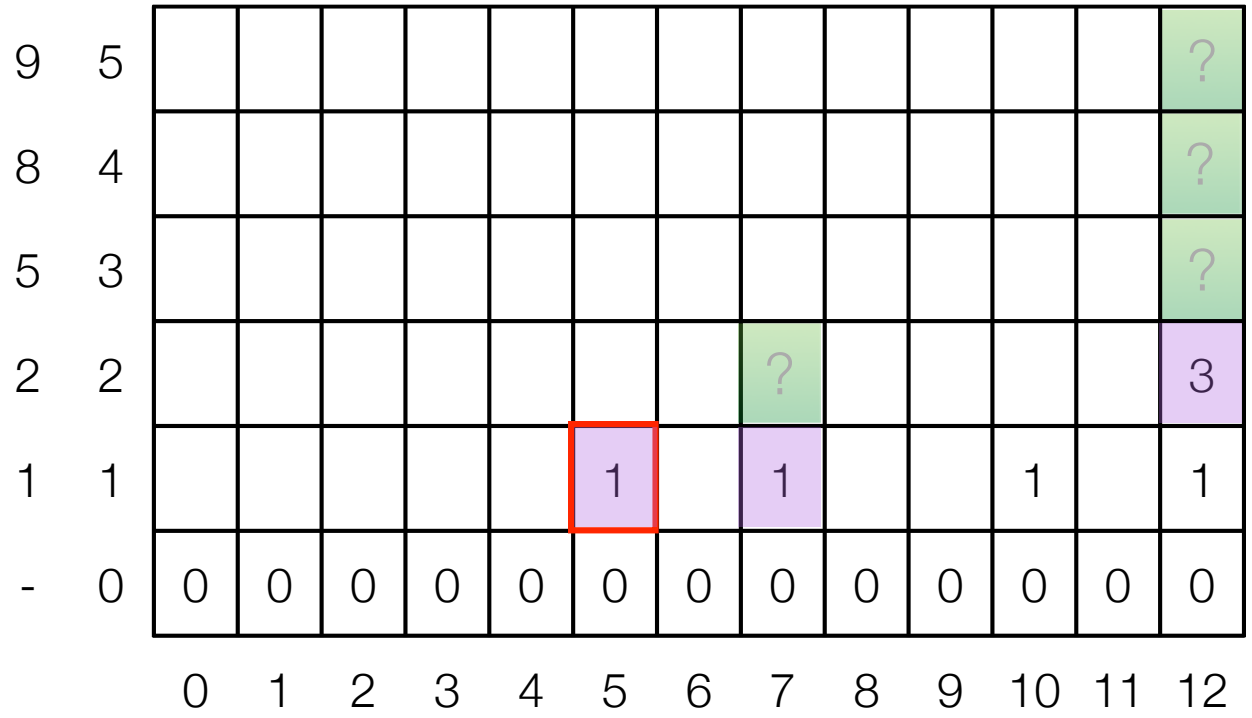

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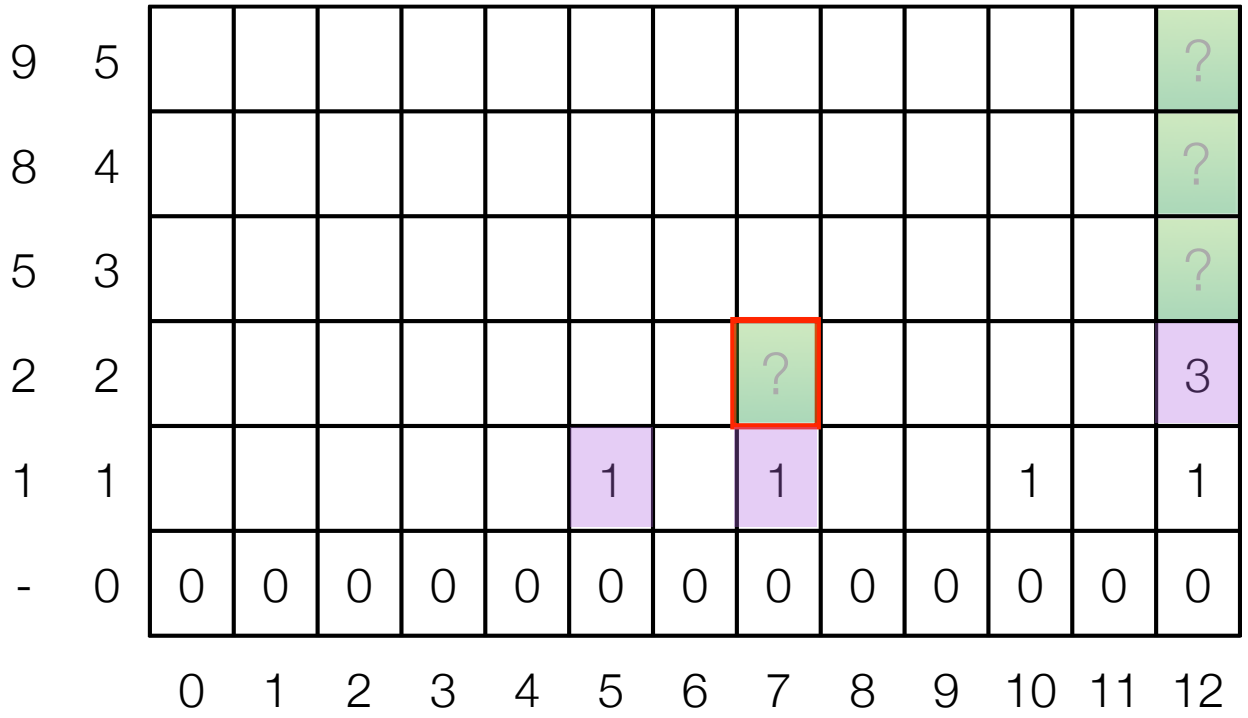

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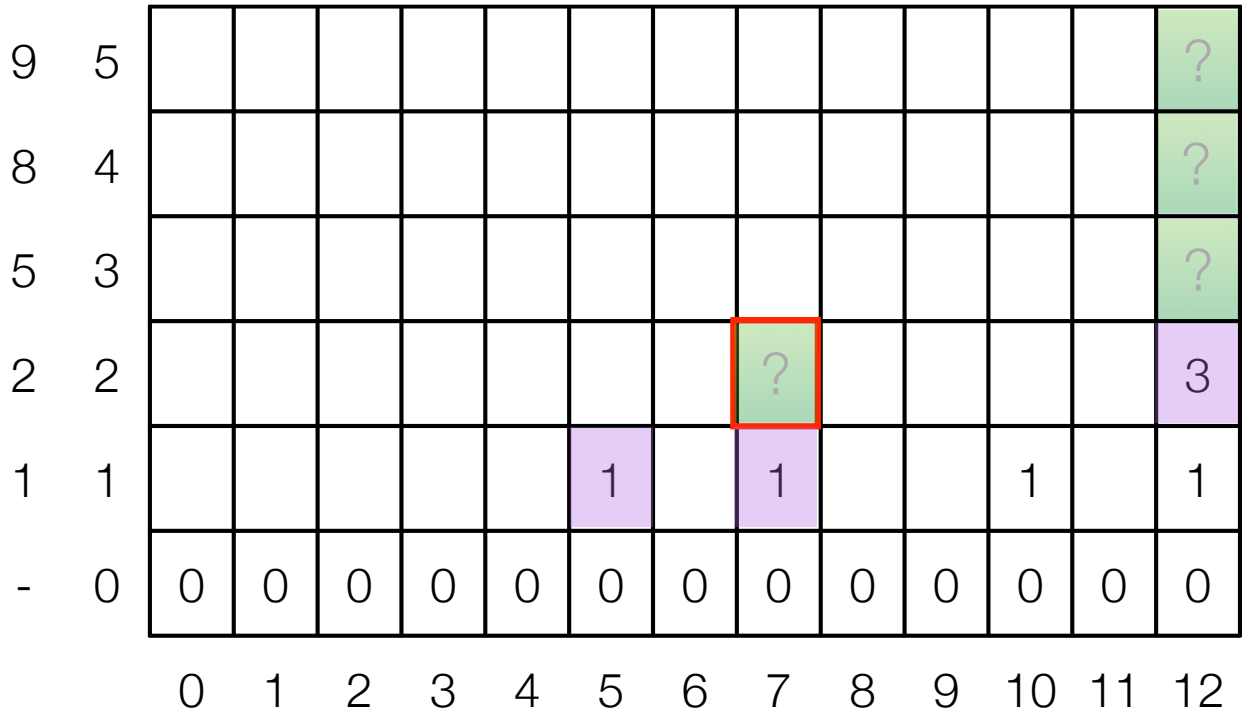

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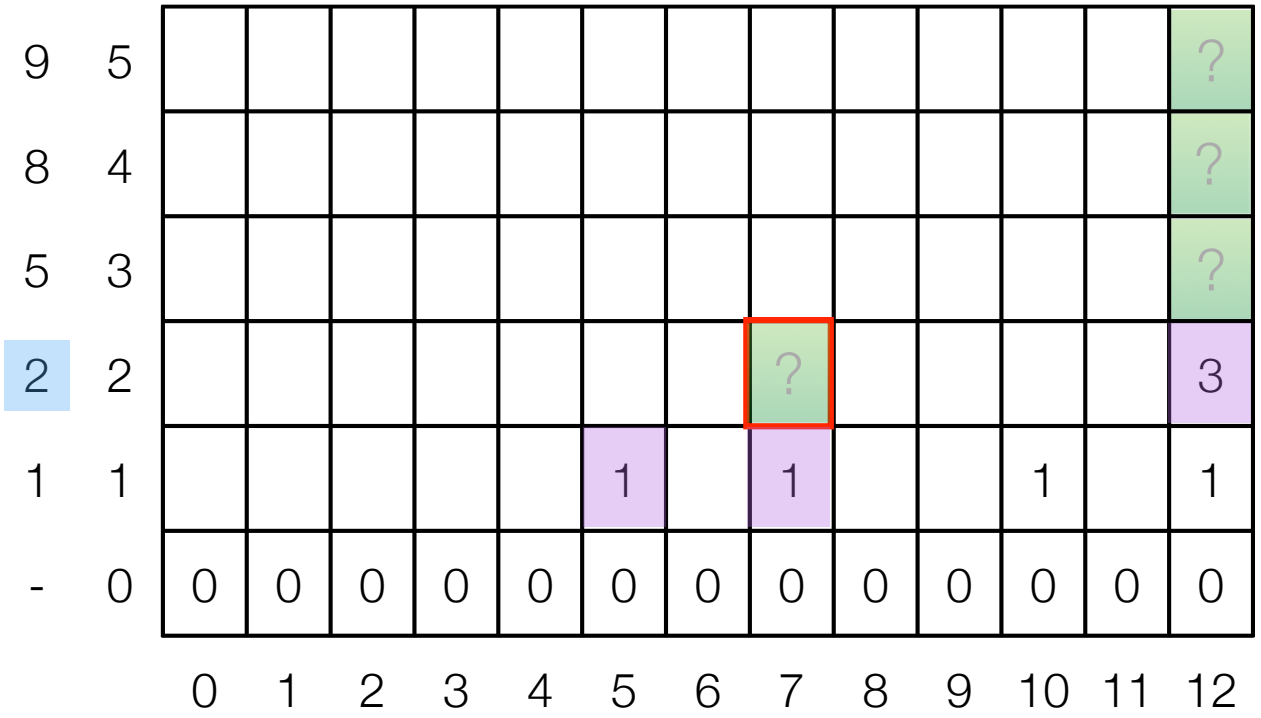

Subset Sum

- Recurrence:

$$\text{OPT}(i,w) = \begin{cases} \text{OPT}(i-1,w) & \text{if } w < w_i \\ \max(\text{OPT}(i-1,w),\ w_i + \text{OPT}(i-1,w-w_i)) & \text{otherwise} \end{cases}$$

1 2 + 1

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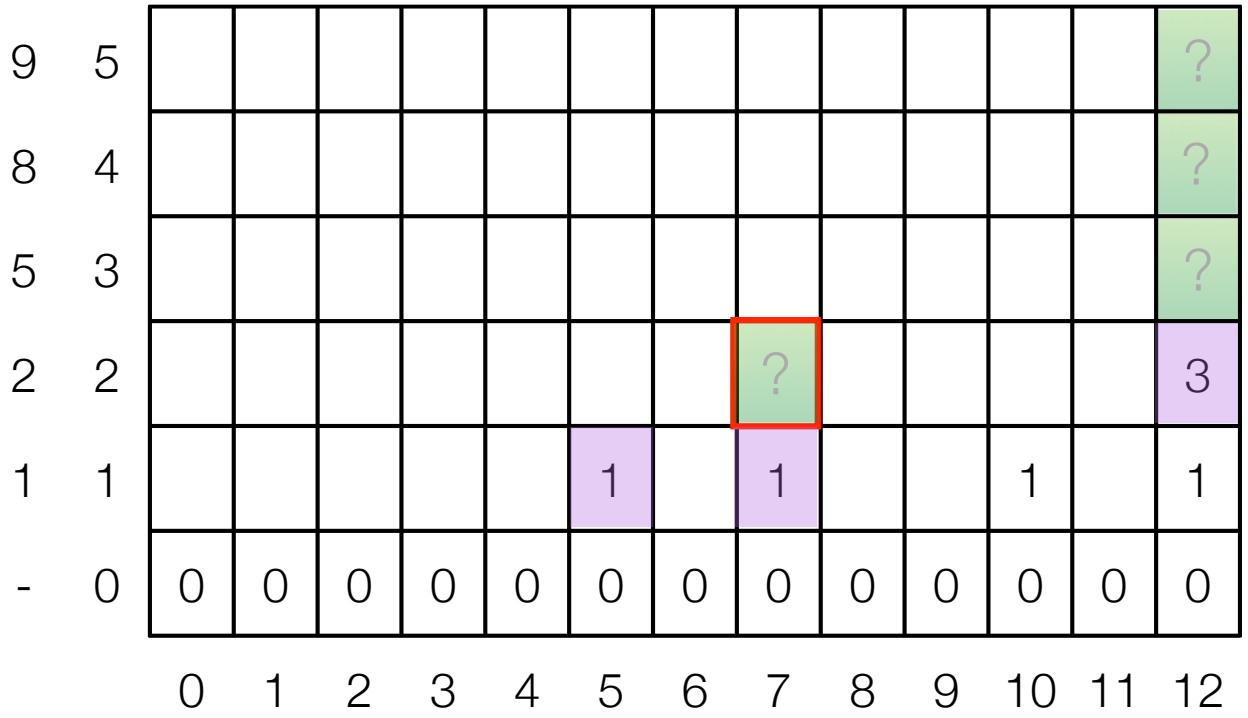

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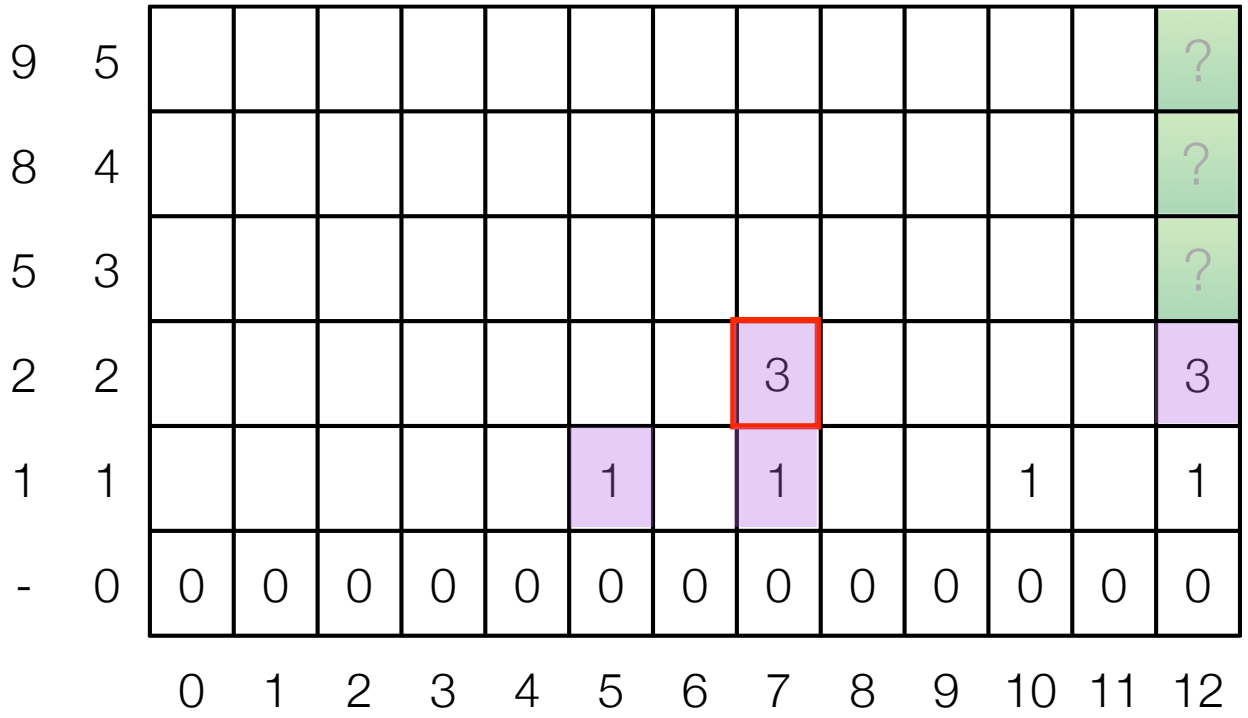

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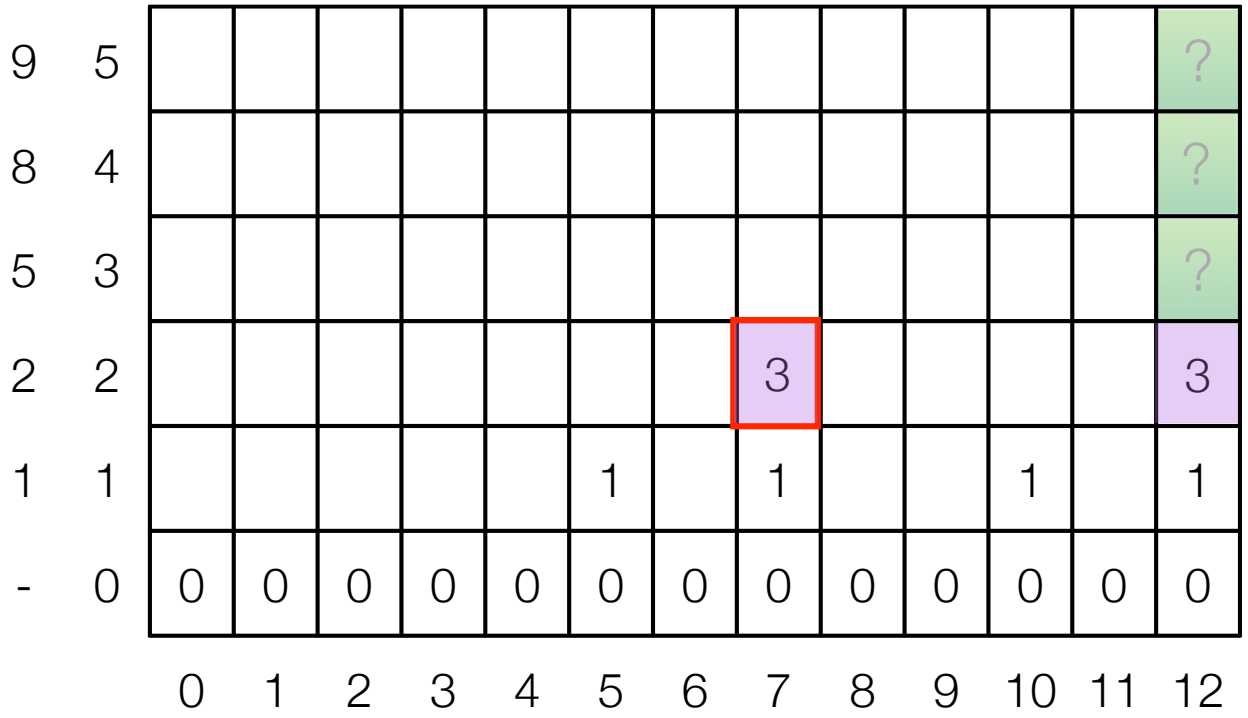

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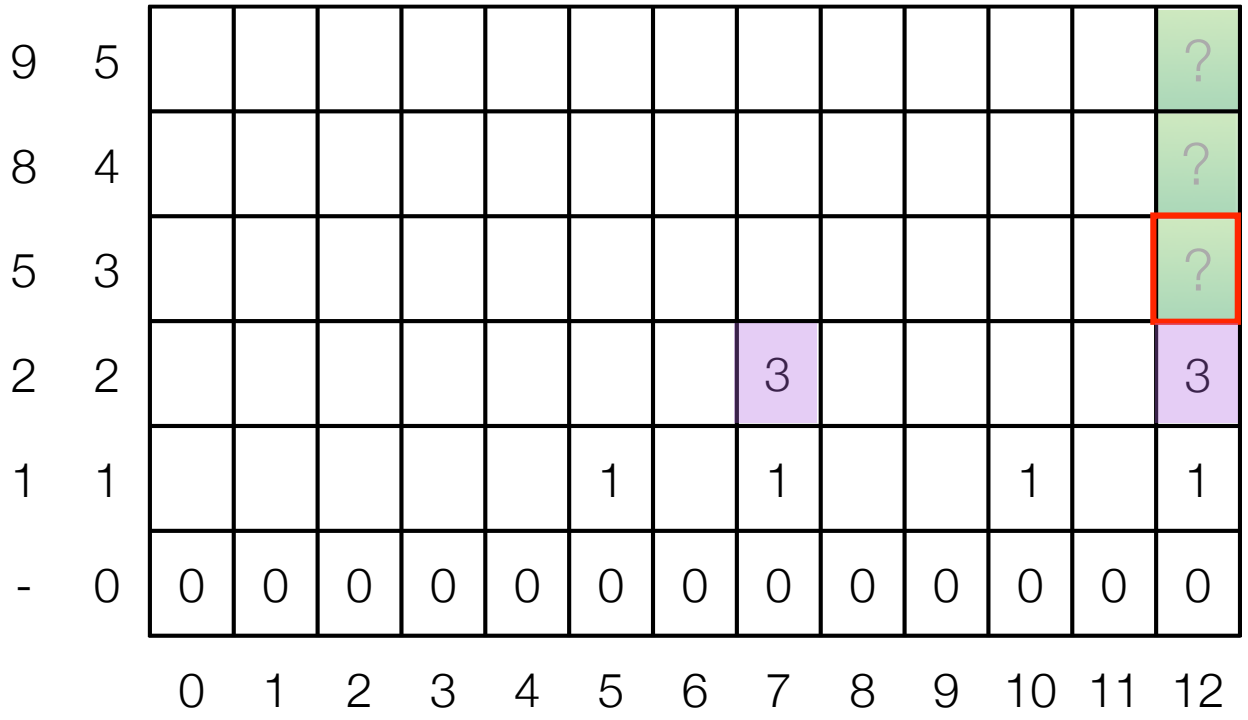

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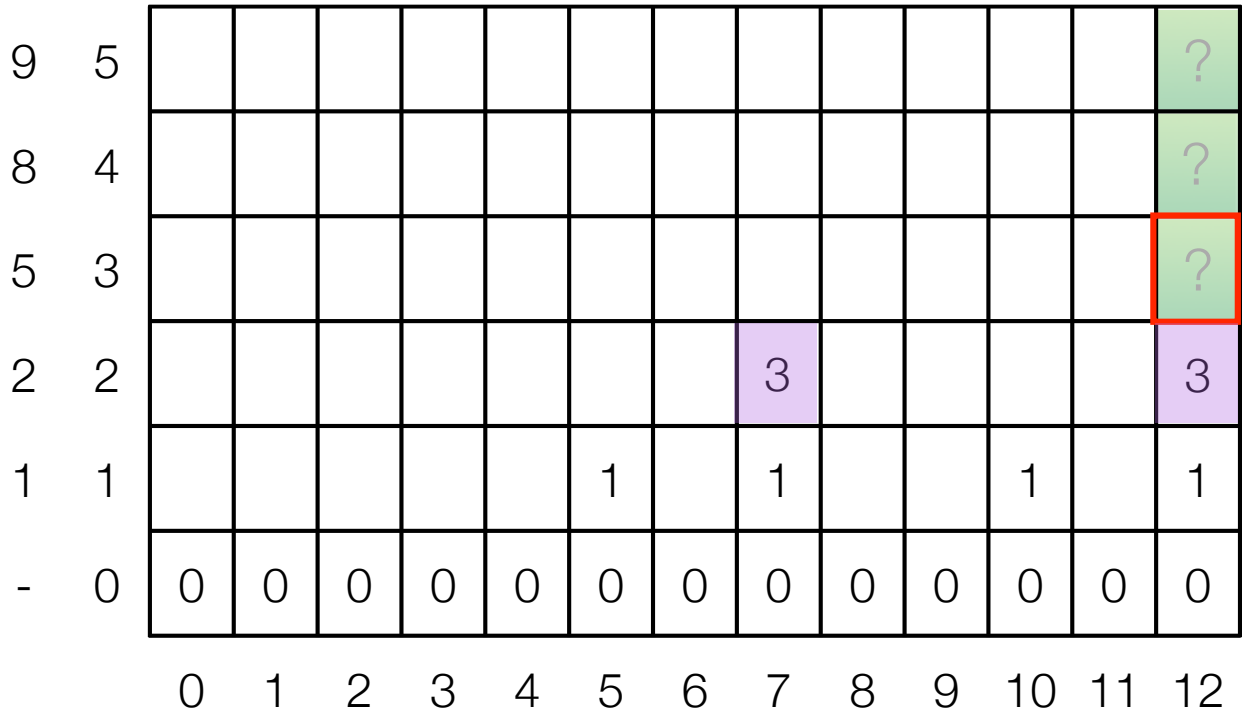

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3

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9	5												?
8	4												?
5	3												?
2	2								3				3
1	1						1		1			1		1
-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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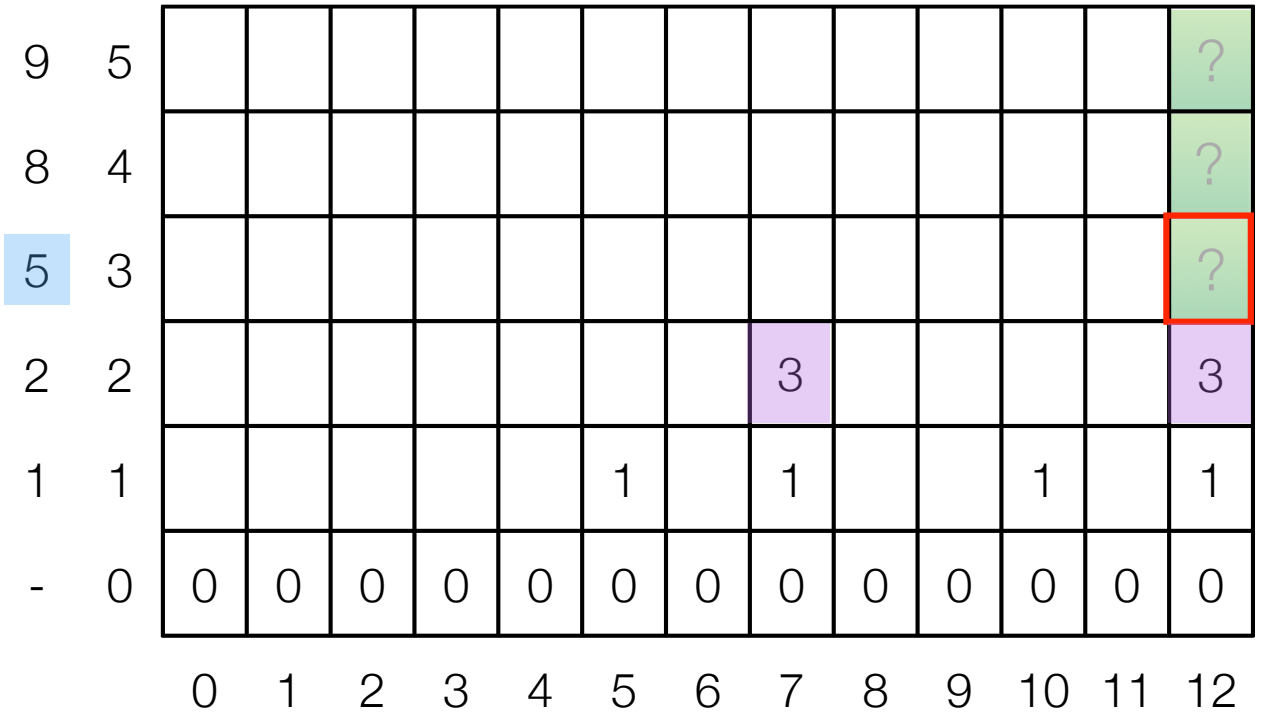

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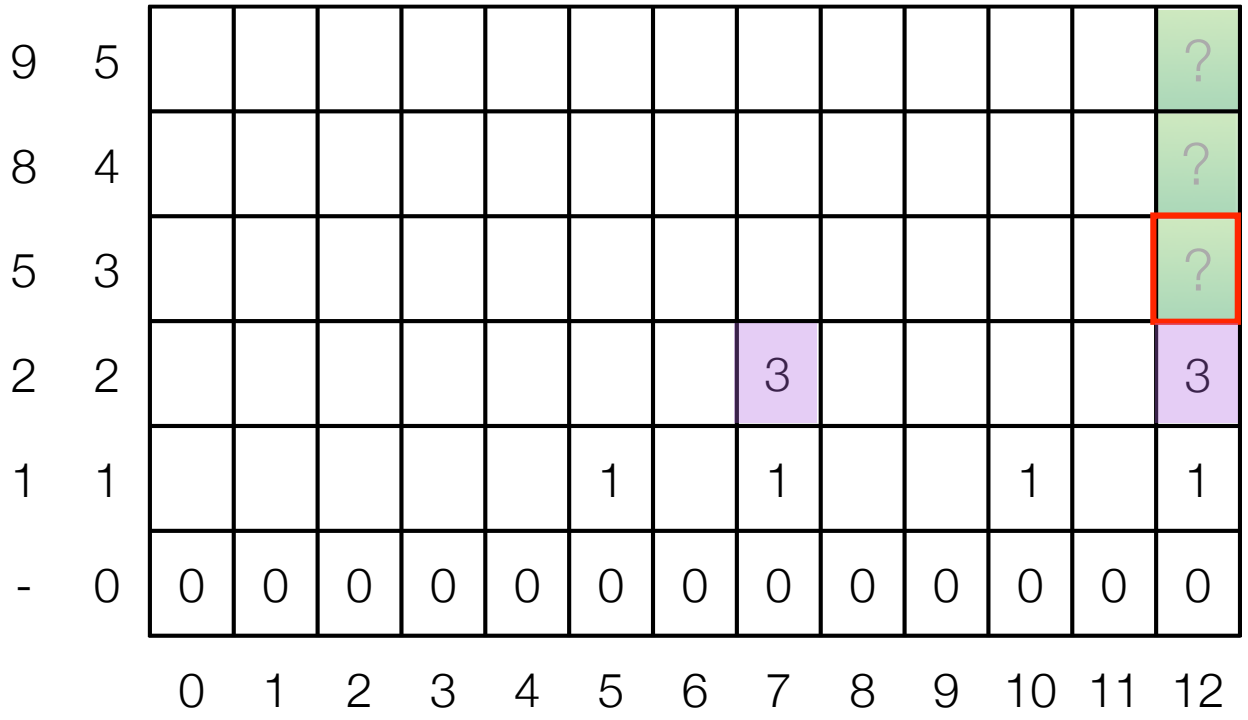

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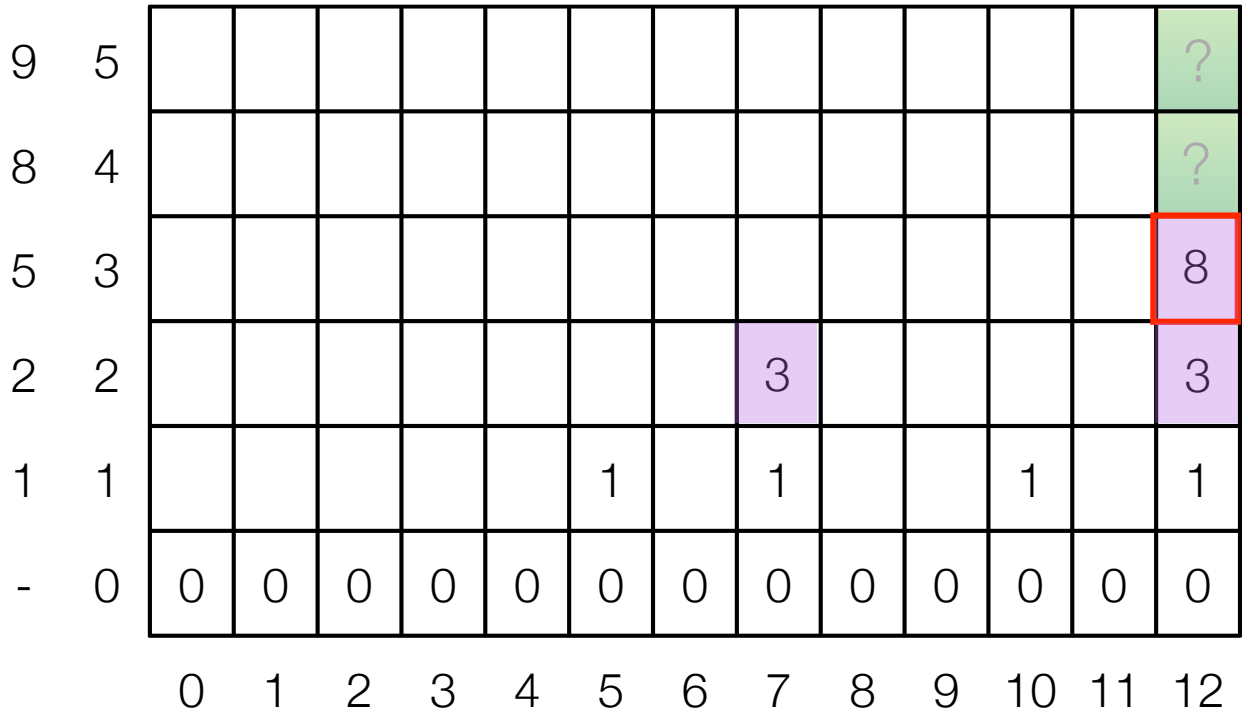

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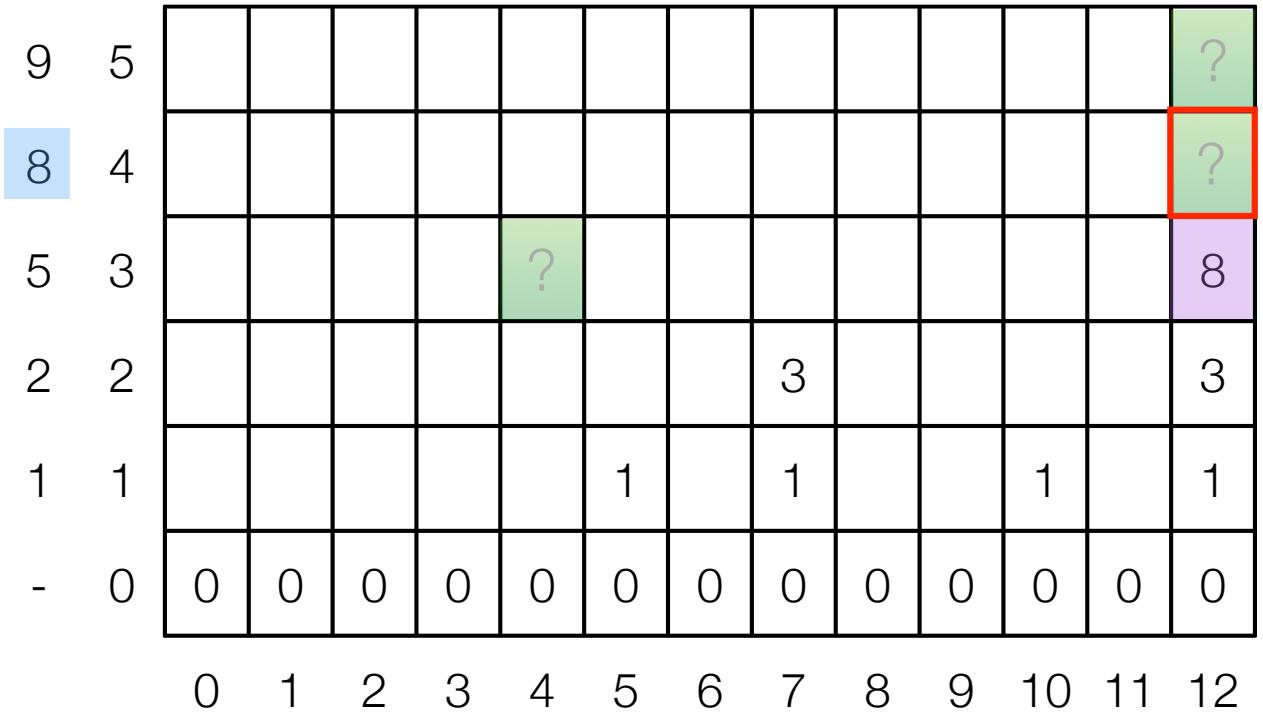

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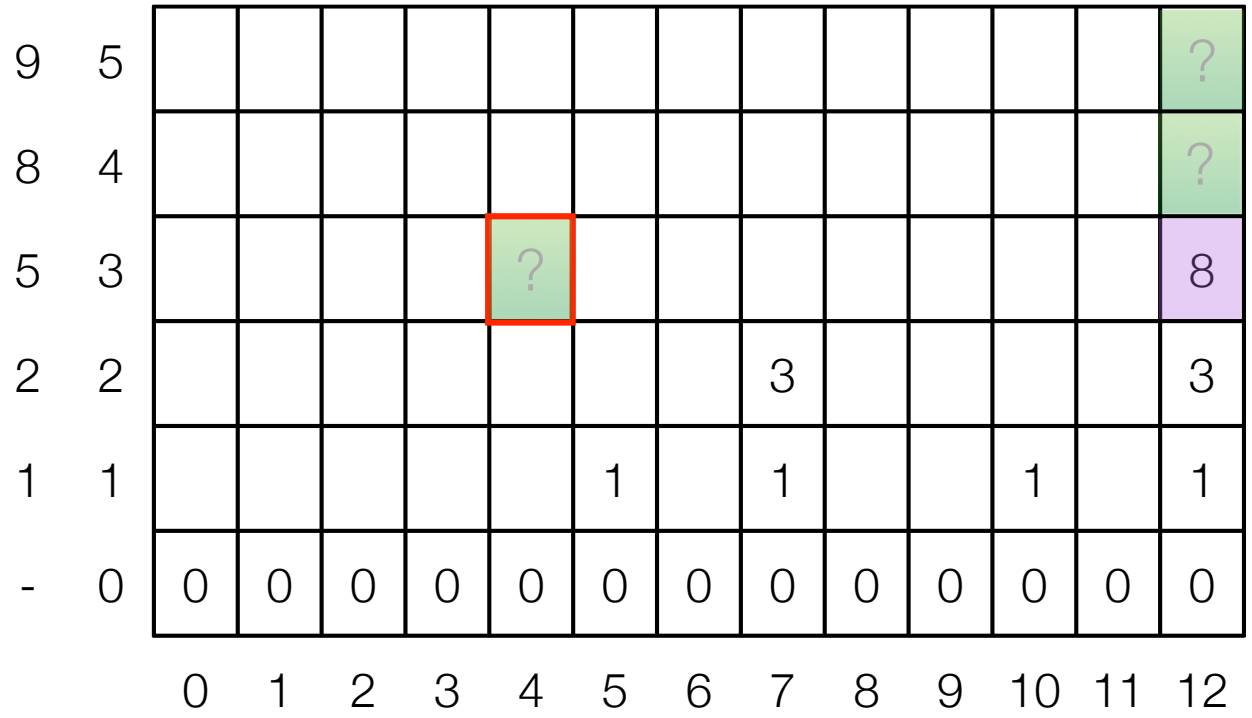

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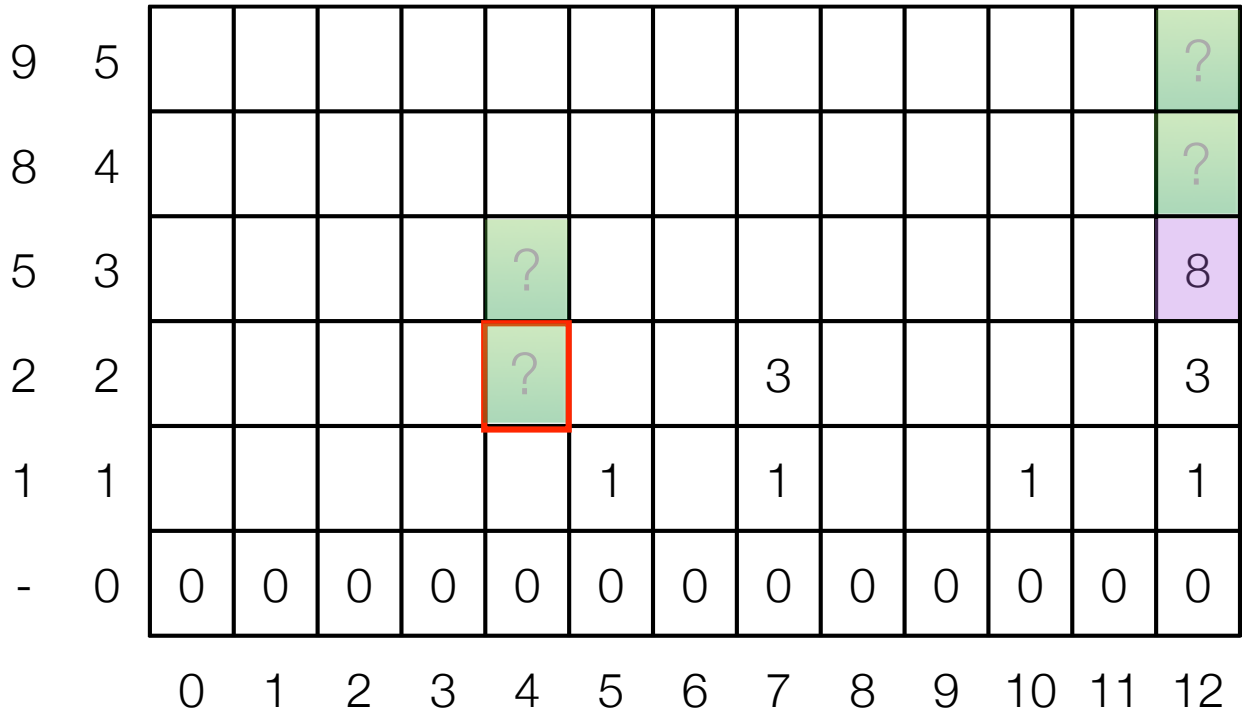

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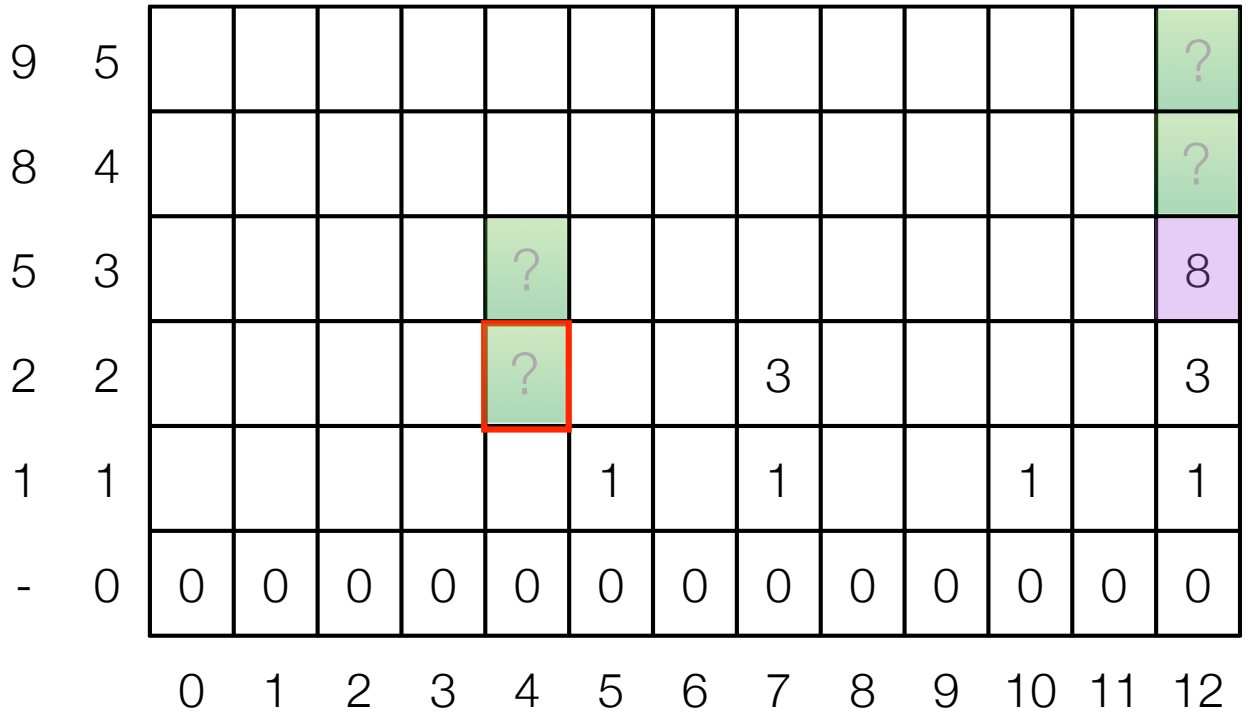

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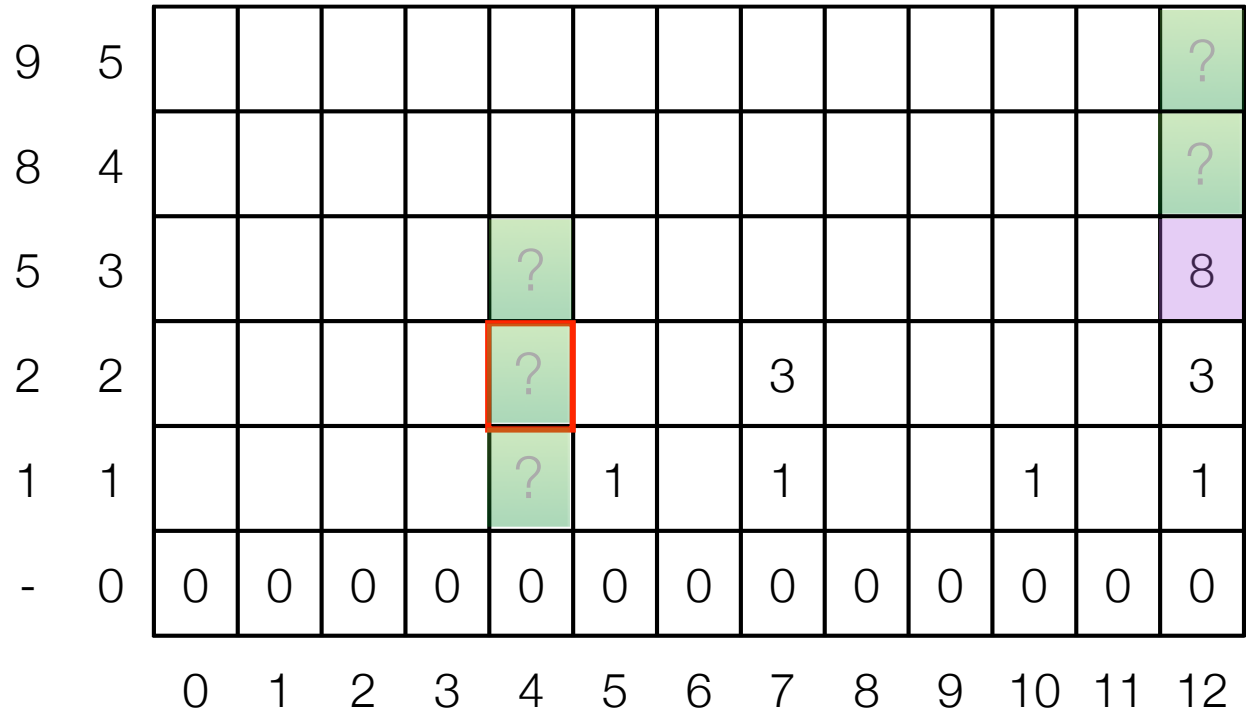

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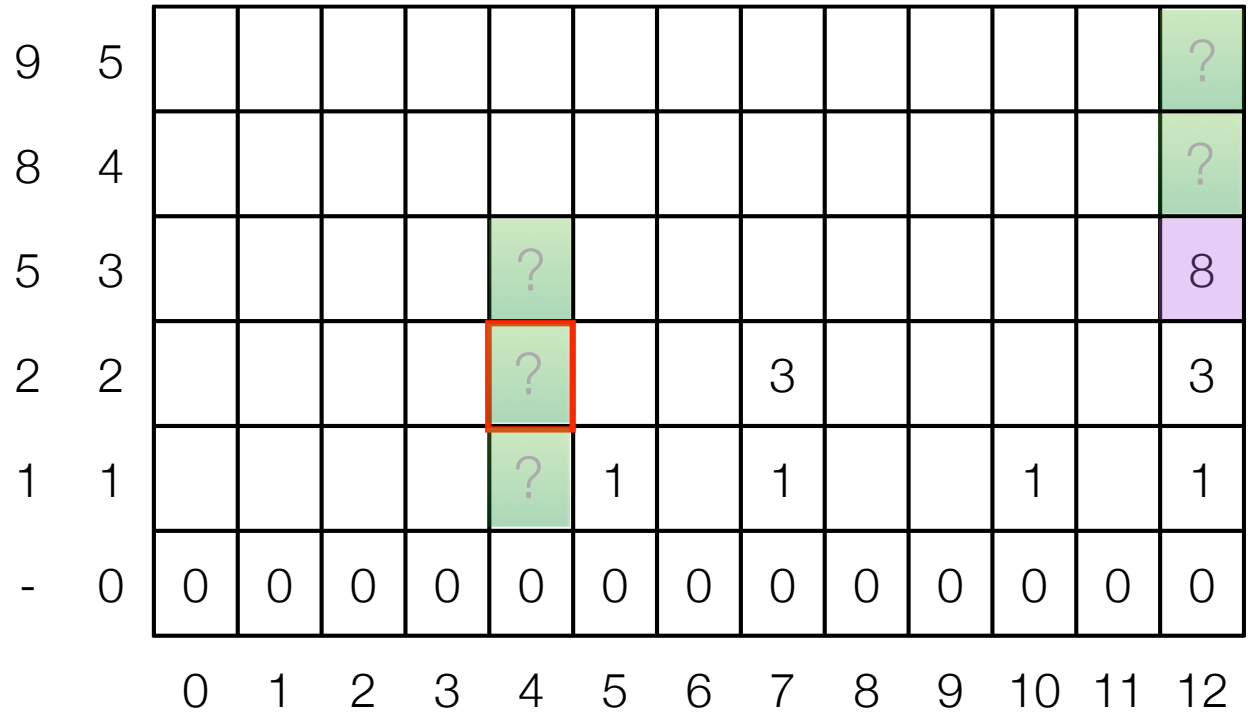

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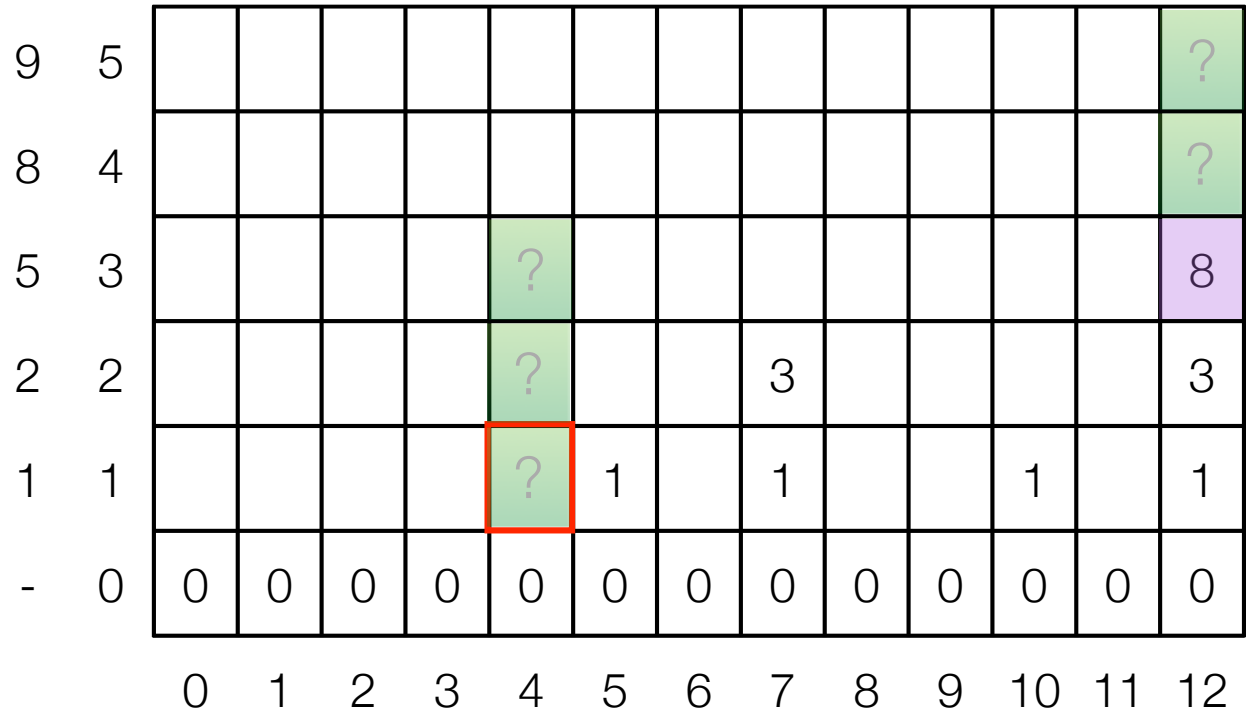

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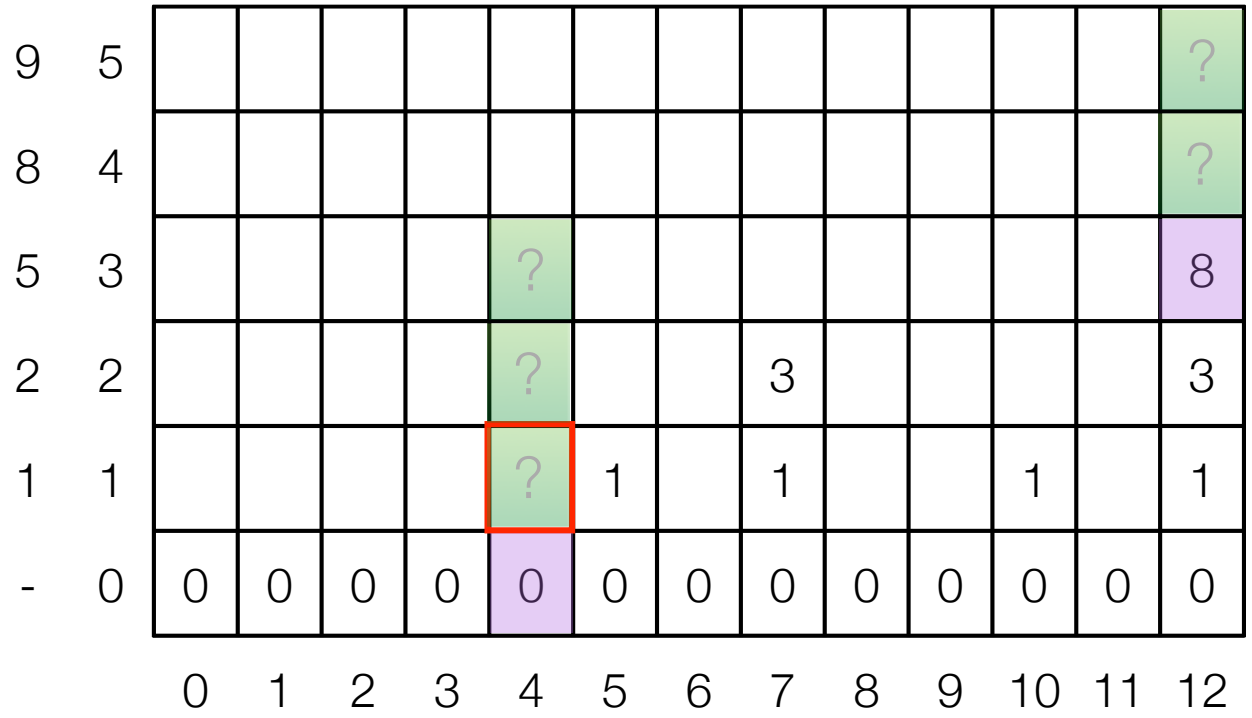

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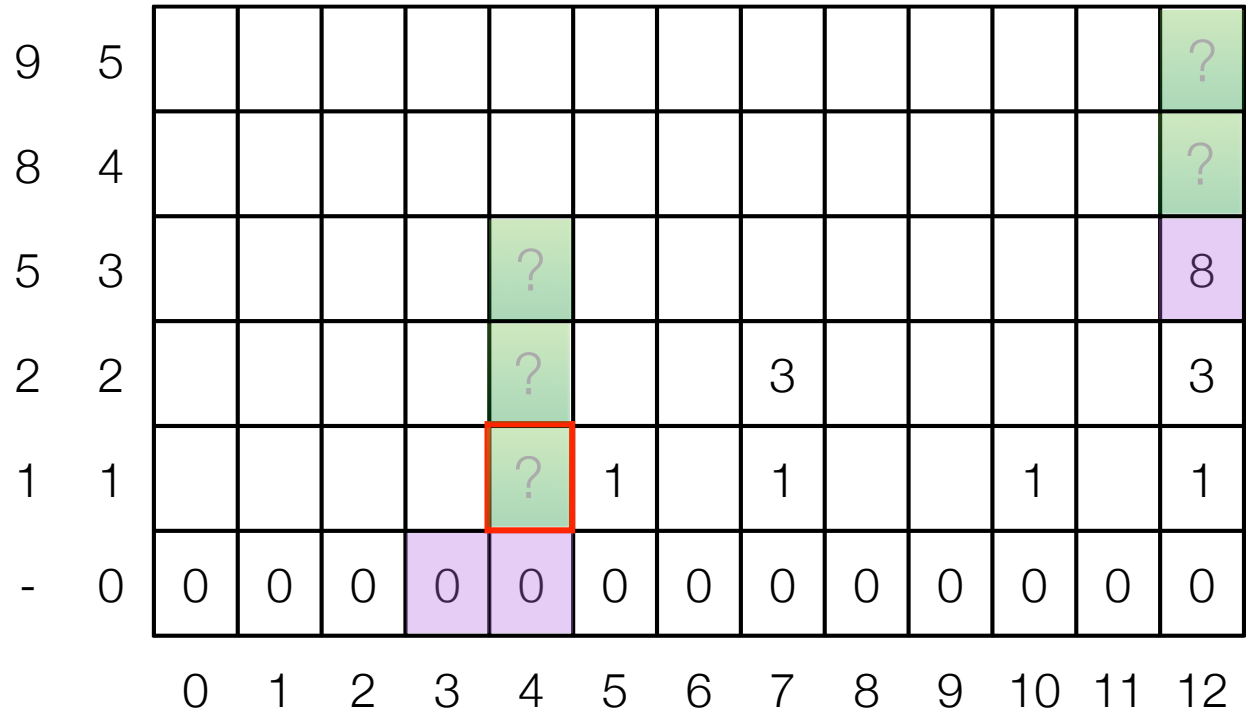

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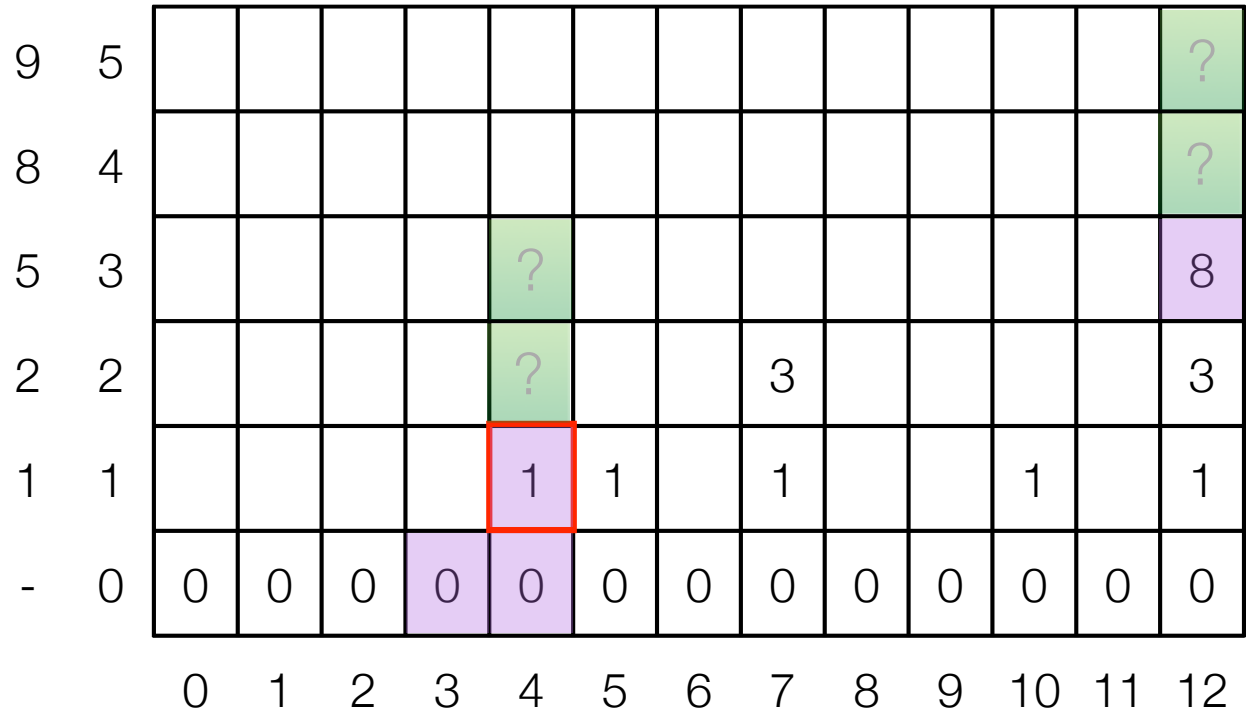

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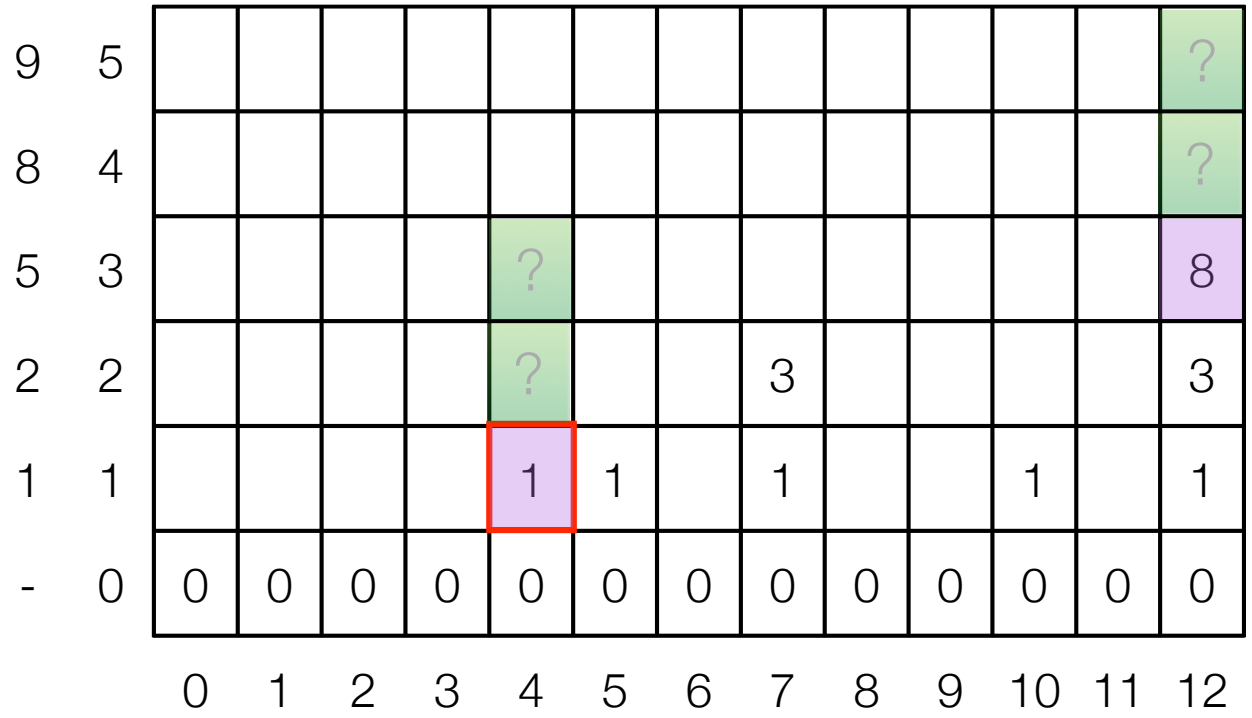

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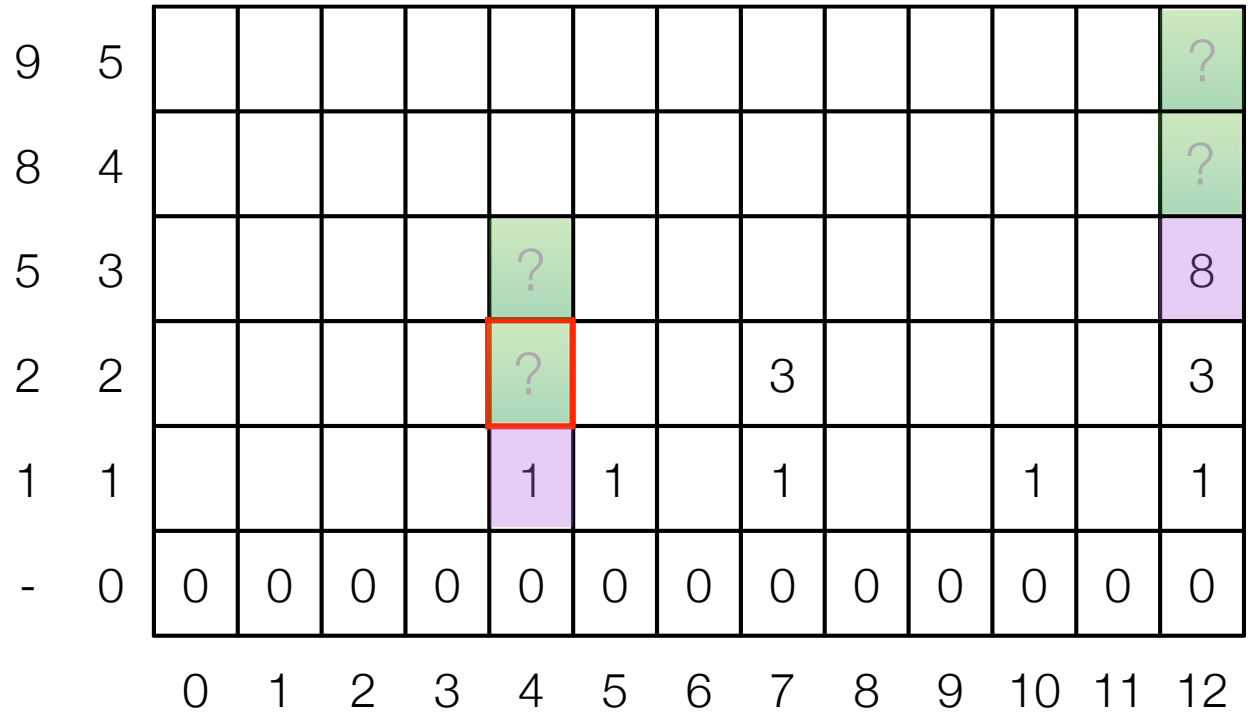

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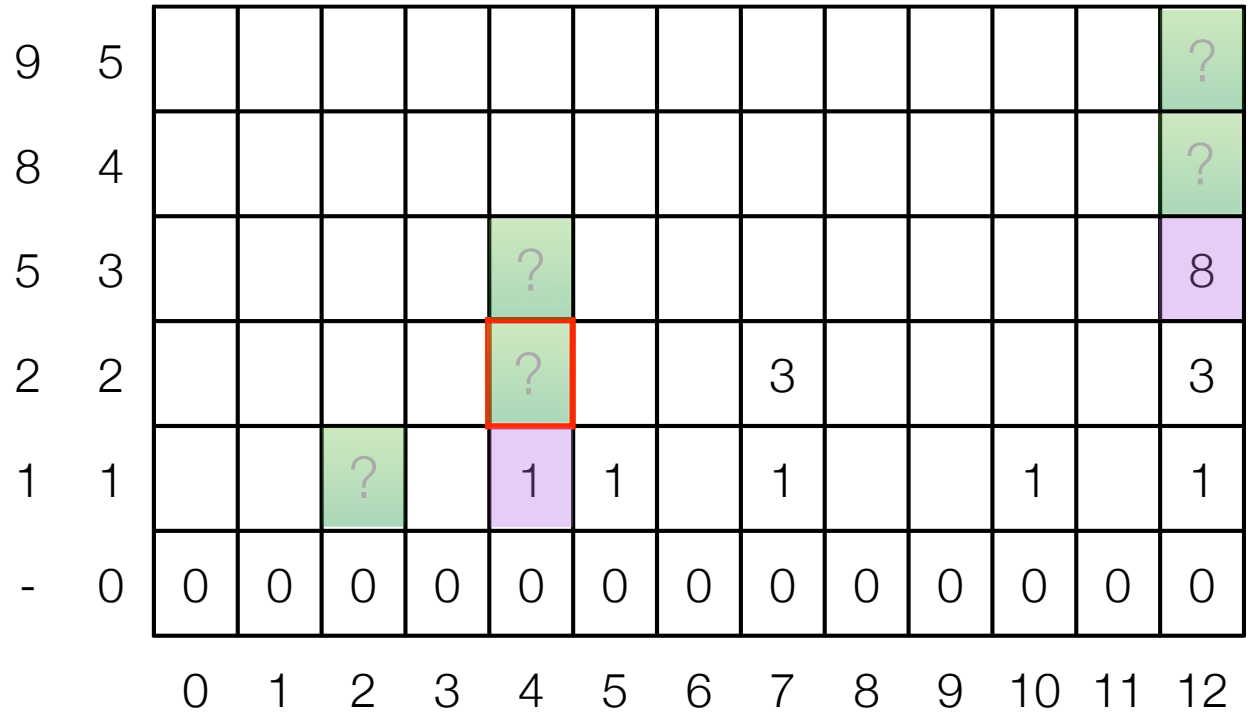

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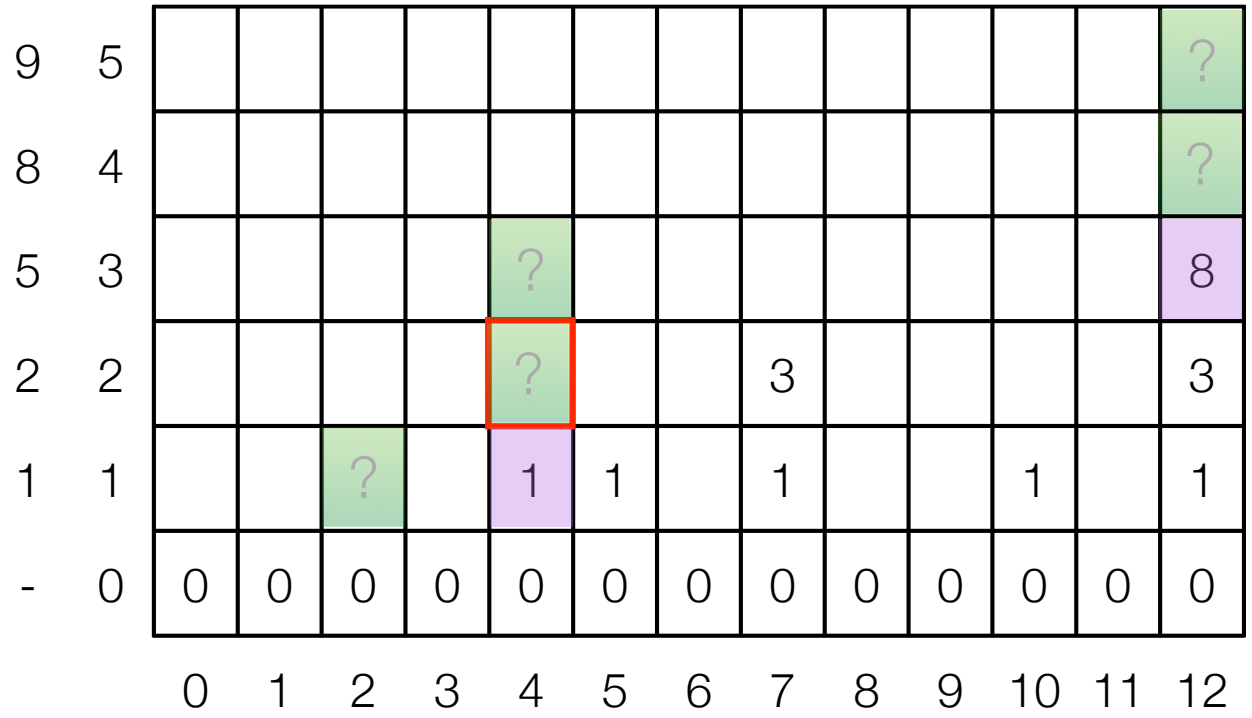

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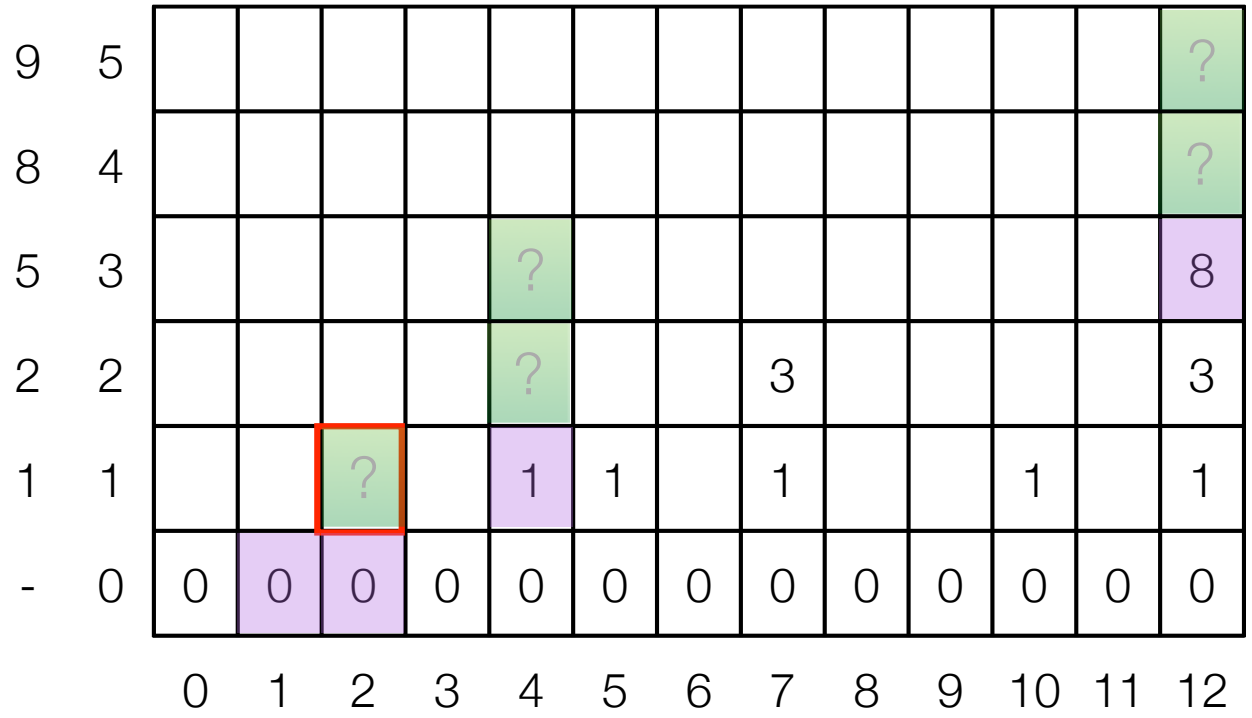

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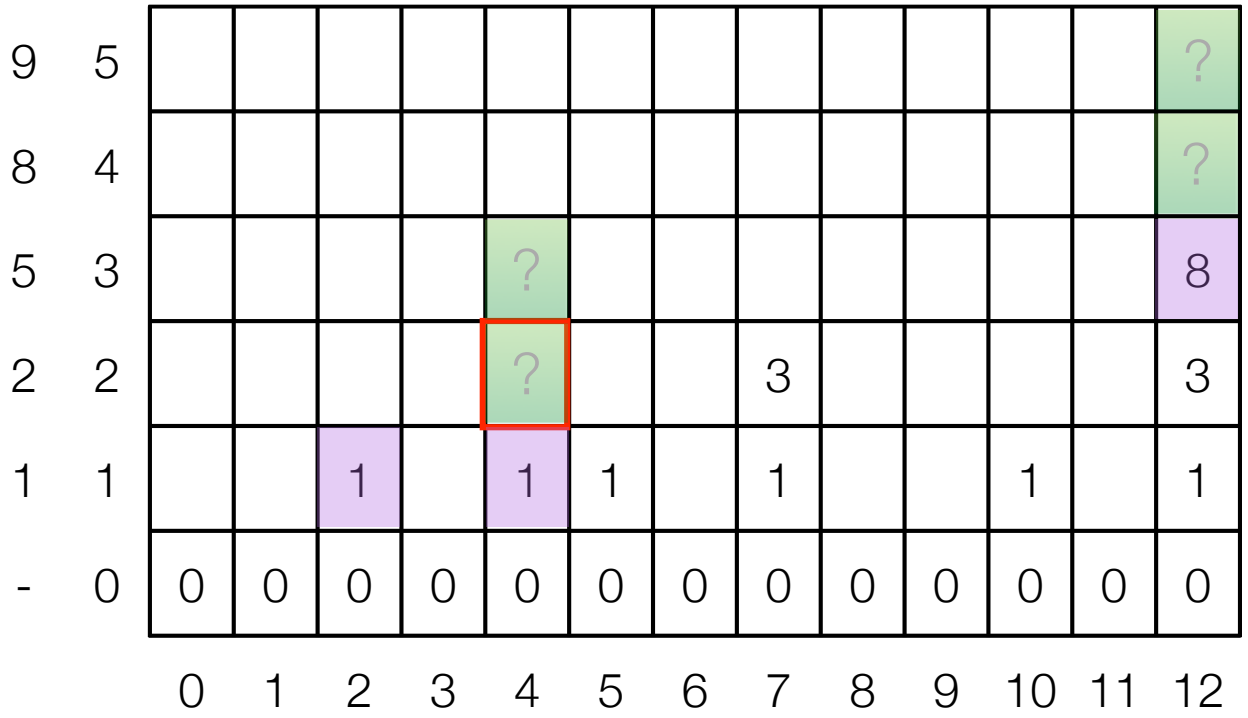

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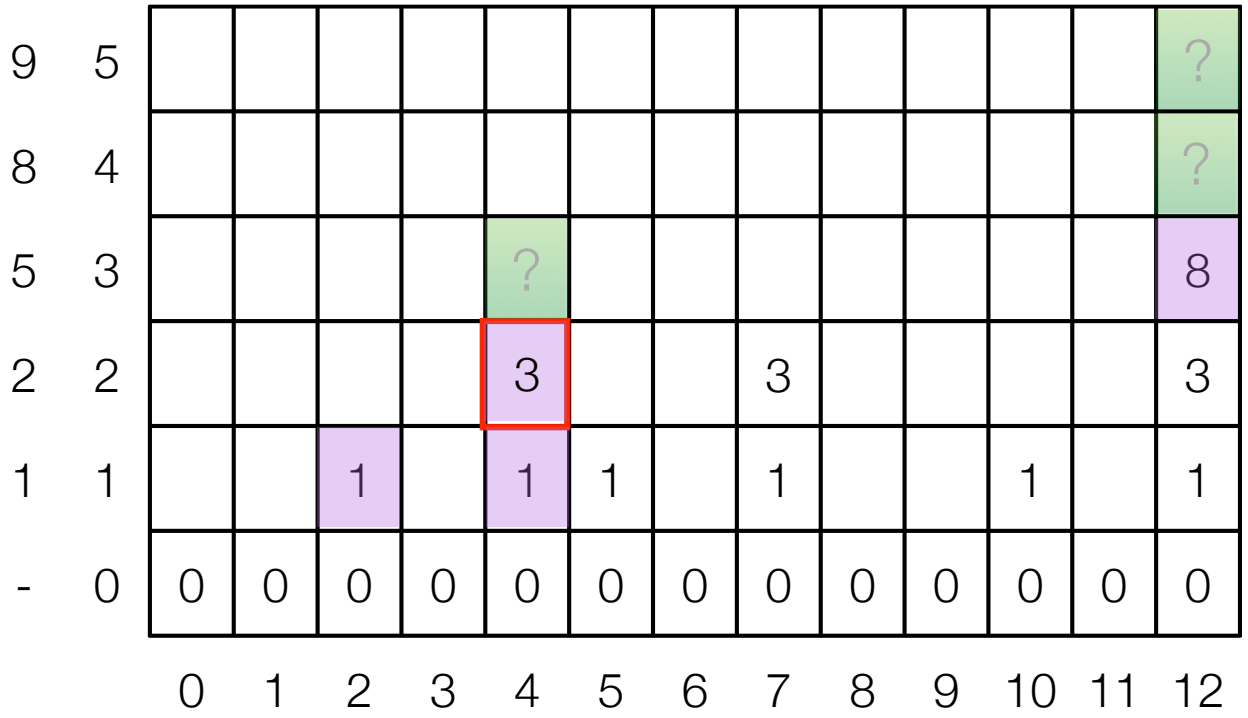

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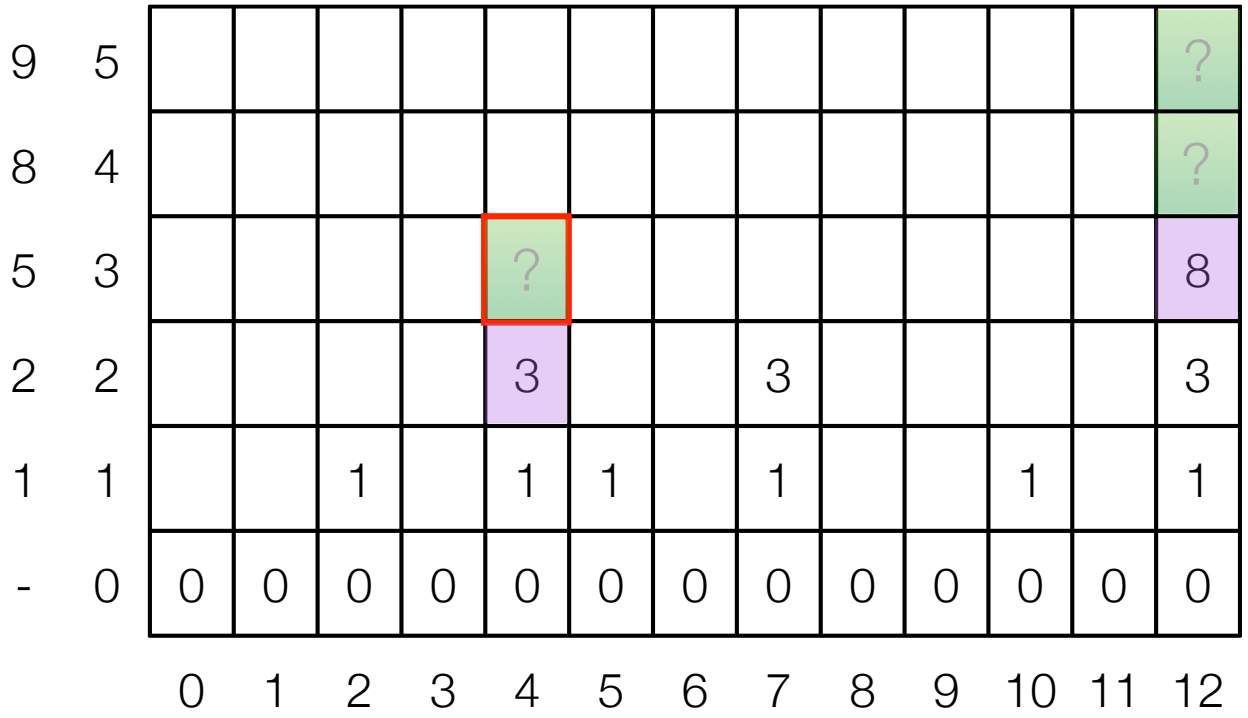

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