

Continuing where we left off, with the second half of the case below.

- Here $gpos = Z$ and $dgpos = Z$ and $position$ is horizontal and $dualPosition$ is vertical and the pair domino (occupying square $(x - 1, y - 1)$) is vertical. Adding this number has either created a new Type II boxed cycle or opened a type II boxed cycle into a larger Type II cycle and a Type I cycle nested in the Type II cycle.

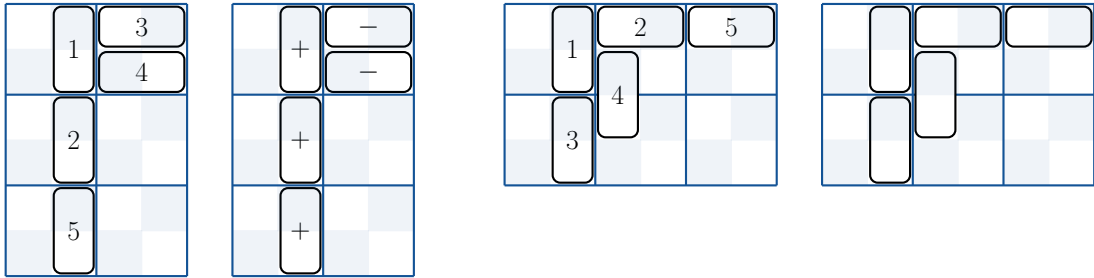
Here we'll do the rest of the cases, that is, where we don't immediately add the next domino, under the assumption that we are creating a new cycle (not breaking a cycle). In these cases, as usual, we're adding one domino and then calling `addNumberSign()`.

Note, there are six cases (counting that the fifth has two examples). They are paired by interchanging sides and then flipping whether the new domino is horizontal or vertical. The pairing is $1 \leftrightarrow 5$, $2 \leftrightarrow 6$, and $3 \leftrightarrow 4$.

- ▷ Here the corner domino has a $+$ sign, the top domino has a $-$ sign, and the column to the left has all $+$ signs. We give the new domino a $-$ sign and then add a $+$ sign below.

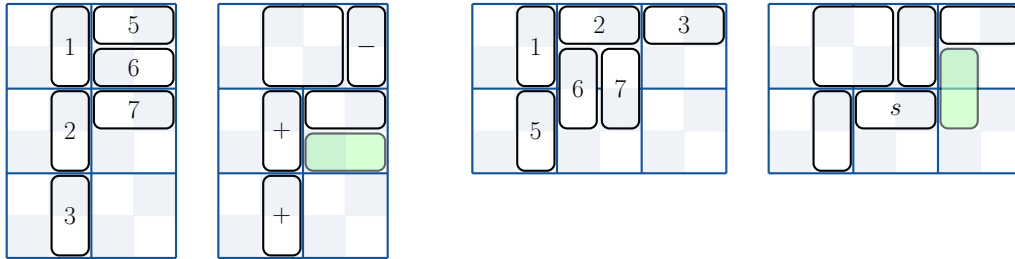


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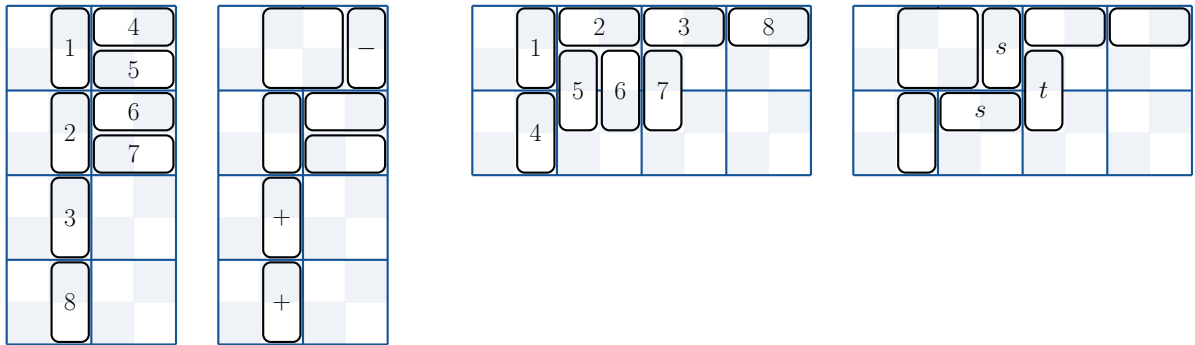


- ▷ Here the corner domino has a $+$ sign, the top domino is blank (with dual sign s), and the column to the left has all $+$ signs. We

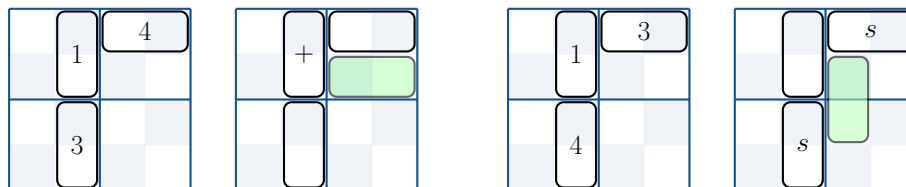
give the added domino a $-$ sign and then blank it and the corner domino. Then we add a $+$ sign below.



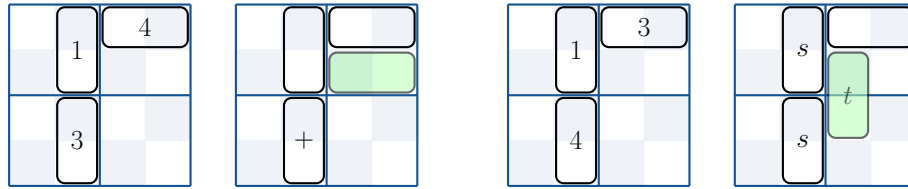
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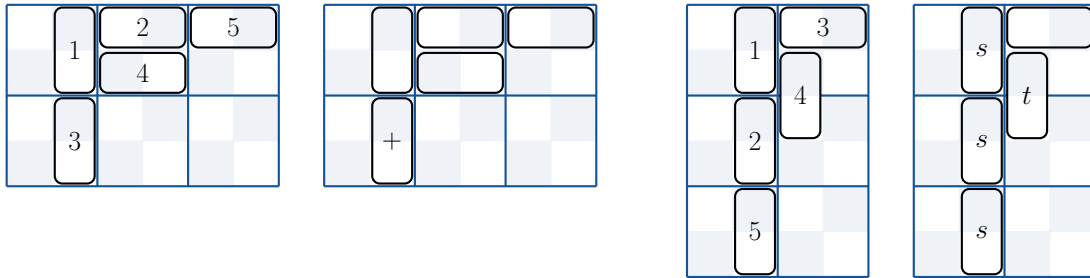
- ▷ Here the corner domino has a $+$ sign, the top domino is blank (with dual sign s), the column to the left has a blank with an s sign, and the row on top has no other signs in it. We'll swap the $+$ with the blank in its column, using `prepareForSign()`. Then we'll give the new domino a t sign, and add an s sign below on the dual side.



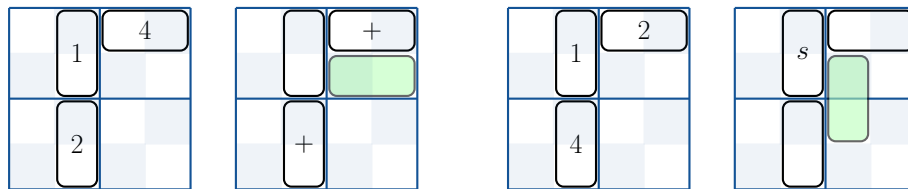
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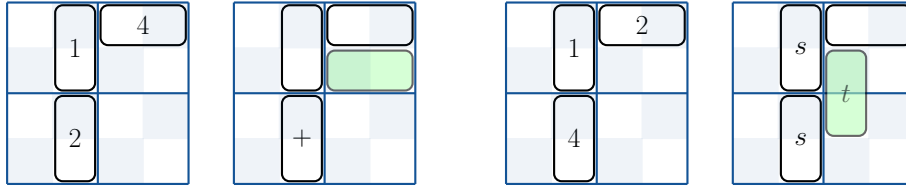
- ▷ Here the corner domino is blank, there is a (+) sign in the top row, and all the dominoes in the column below the corner domino contain + signs. We'll swap the signed domino with the corner domino, using `prepareForSign()` on the dual side. Then we'll proceed as in two cases ago.



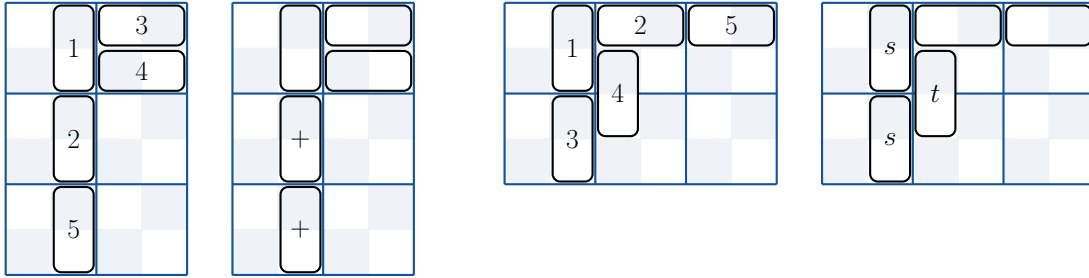
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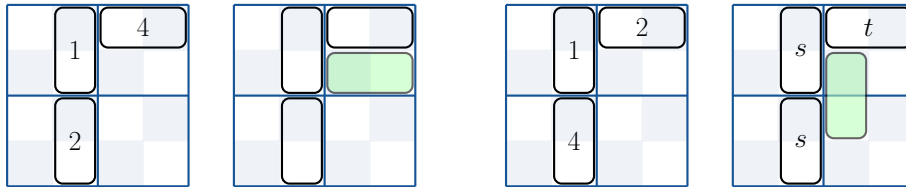
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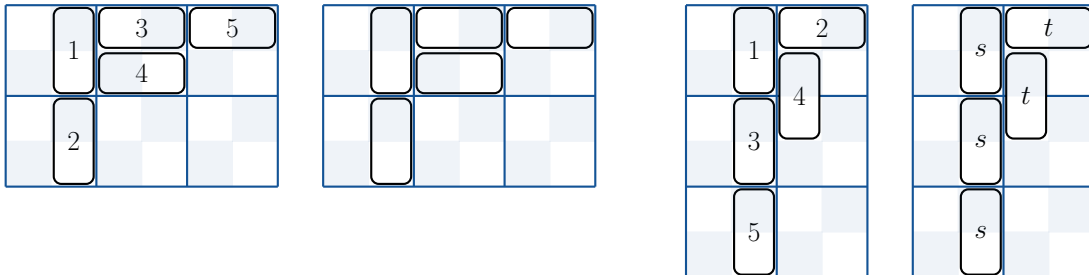
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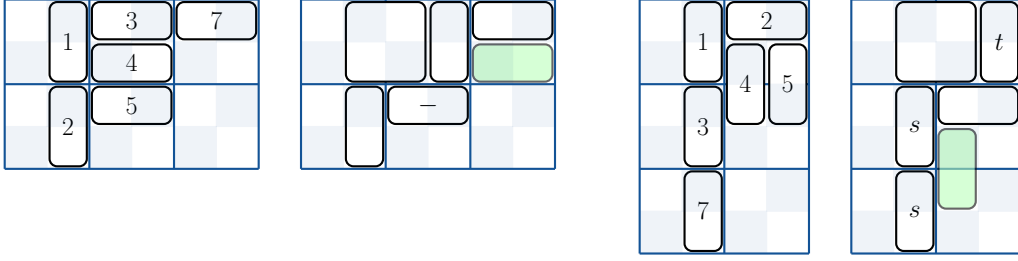
- ▷ Here there is no sign in the top row. In this case, on the dual side, the column is filled with (s) signs. We give the new domino a t and go down with an s on the dual side.



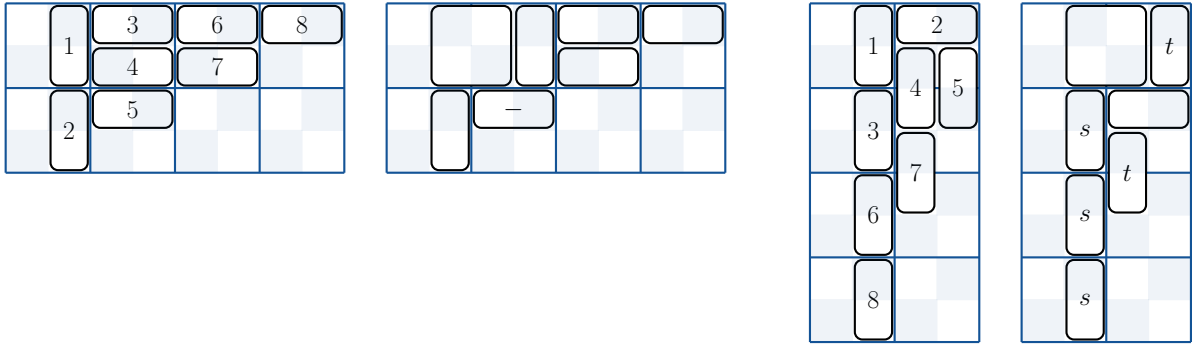
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Here is another example. (The column need not be all blanks.)

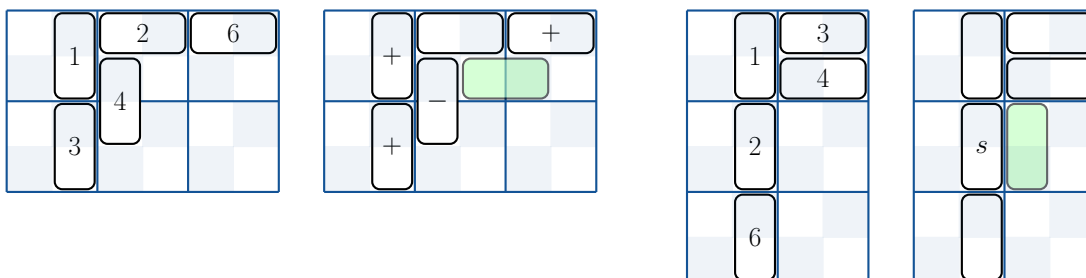


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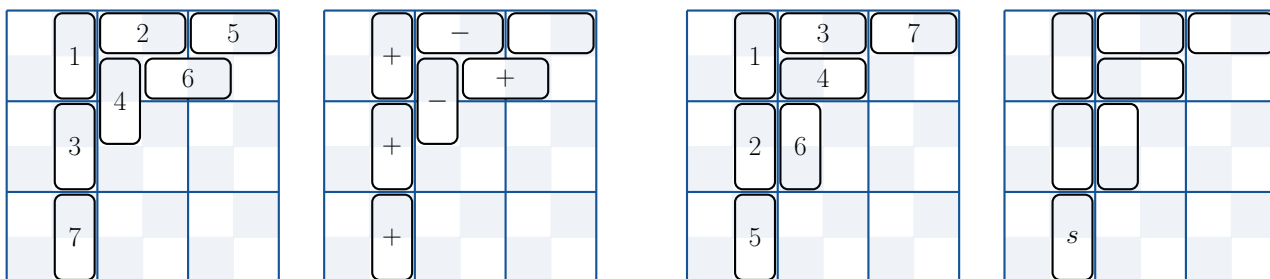


There still remains the cases where we break a cycle and don't close it again. They parallel the cases listed above. We also need to include the adjustments which we made in the other list of cases, for when there is a relevant shape change.

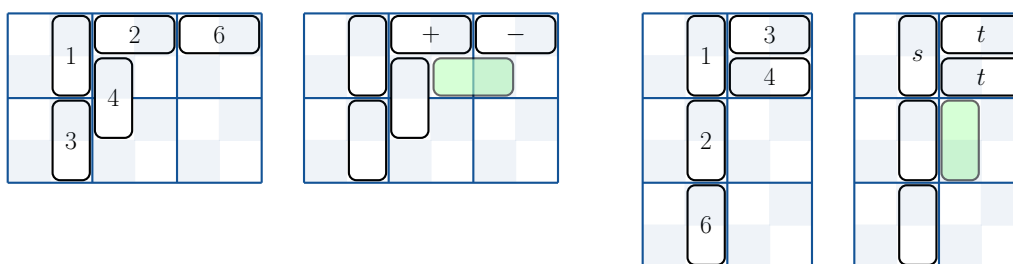
- Here $gpos = W$ and $dgpos = X$ and $position$ is horizontal and $dualPosition$ is vertical. Here we are extending an unboxed cycle. With (x, y) the coordinates of the square in grid position W , the pair domino occupies $(x - 1, y - 1)$. The pair domino is the top of the cycle which we are adjacent to. There are several cases.
 - ▷ Here the pair domino is blank (with s on the dual side), and there is a $(+)$ sign in the row of the pair domino. Here we just swap the blank with the $+$ sign (using `prepareForSign()` on the dual side), and give the new domino a $-$ sign. Then we adjust the signs in the new domino and the pair domino (and their duals if necessary) to match the cycle which we are joining. Then we add a $+$ sign below. Here is an example.



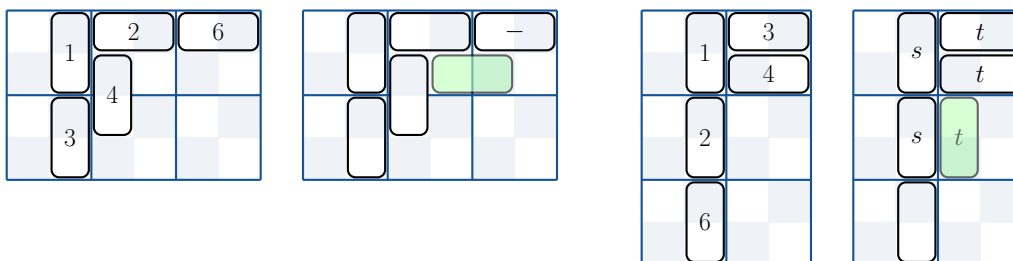
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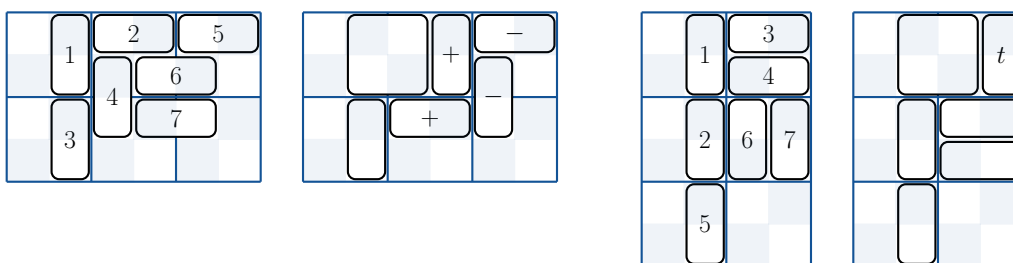
- ▷ Here the pair domino has a (+) sign. We give the new domino a $-$ sign, and then adjust the pair domino and new domino signs to conform to what's already in the cycle. If the domino to the right of the pair domino has a $-$, we're done (except for adding a $+$ sign below).



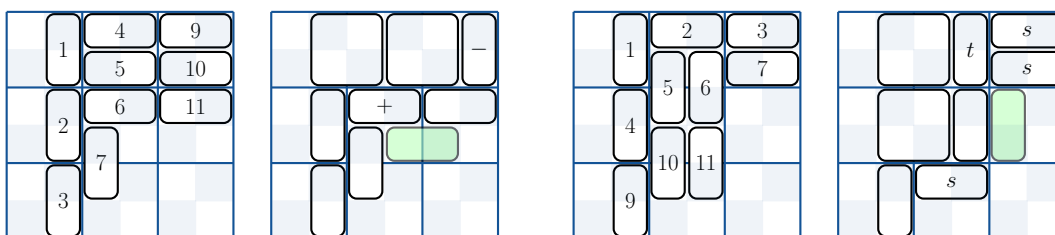
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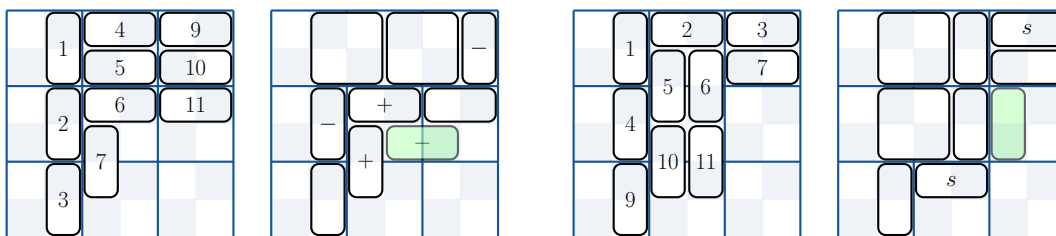
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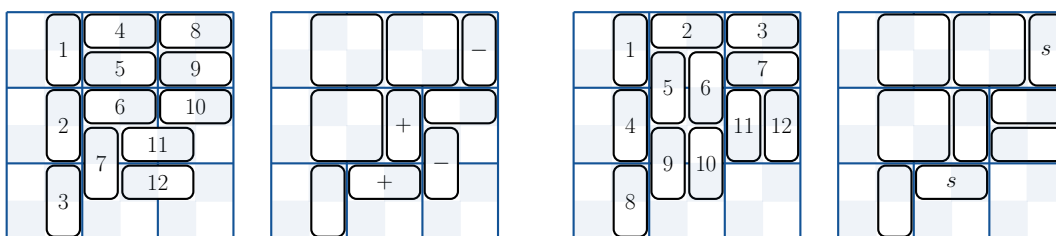
If instead the domino to the right of the pair domino is blank, we need to put that sign (on the dual side) into the cycle. We do this as if first placing the sign in the bottom of the old cycle, and then extending this cycle by one pair. Note that since we are placing the sign into a boxed cycle, there will not be a shape change.



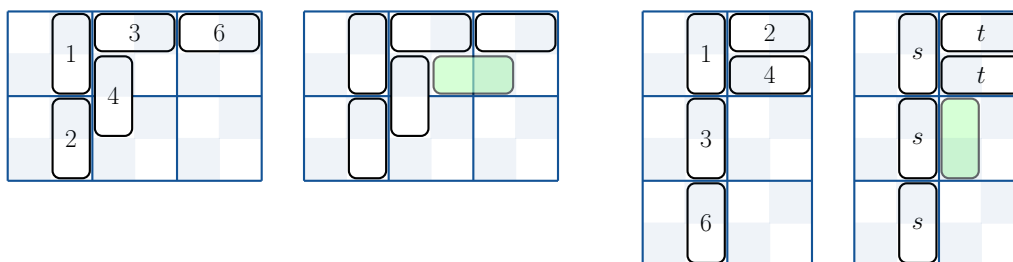
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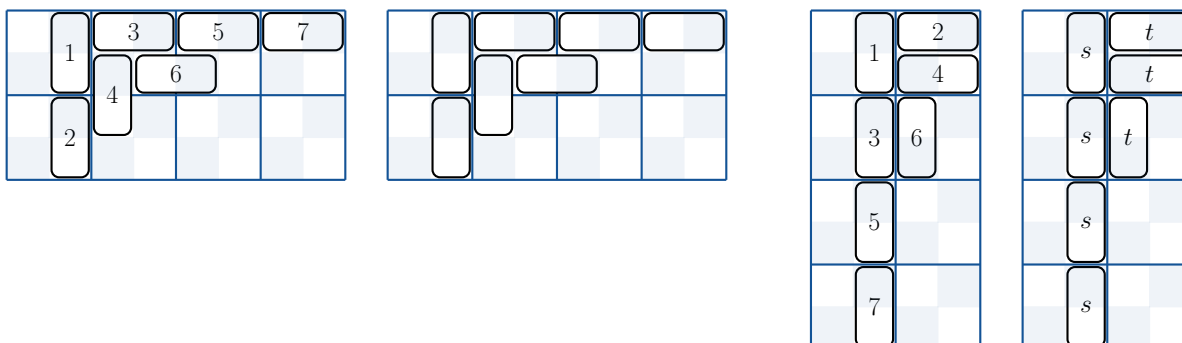
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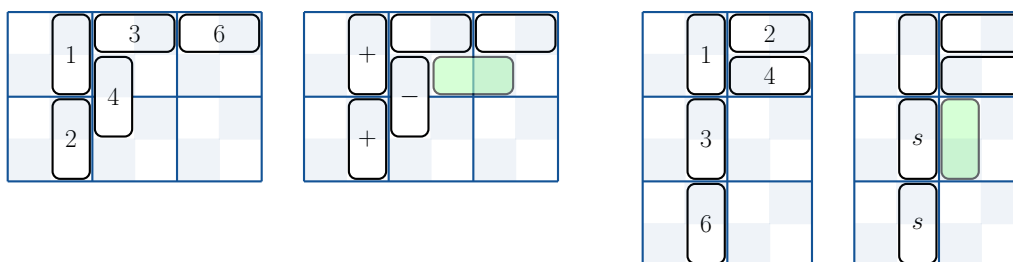
- ▷ Here the pair domino is blank (with sign s on the dual side) and all the dominoes in its row to its right are also blank. We'll give the new domino in the dual tableau a t sign, and then make the new dominoes and their pairs compatible with what is there already. Then we'll add an s sign below in the dual tableau. Here is an example.



goes to



Here is another example.



goes to

