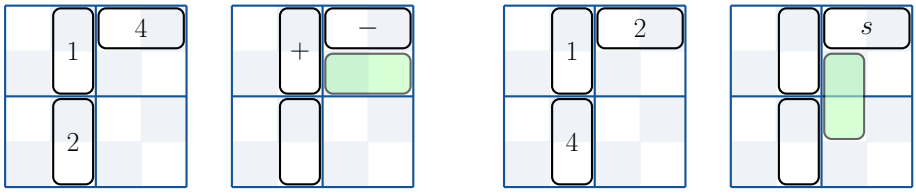
Continuing where we left off:

- 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.

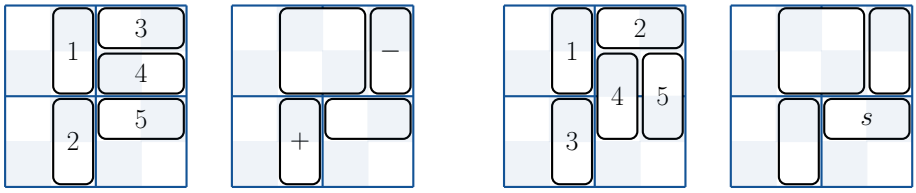
  Sometimes we don't care which happened, because we'll be closing the cycle back up again. Though, in some of these times, the situation where we broke a cycle is more complicated. To be more precise, we need to be careful of the situation where our manipulations put a sign into an unboxed cycle on the dual side. There is a possibility that this is the cycle which was broken. If also we make a shape change while doing this, we need to adjust to that. (Putting a sign into a cycle in the left sign tableau will not do anything. Shape change only happens when putting a sign into an unboxed cycle. However, if a cycle is broken, it is a boxed cycle on the left side.)

  Let's look first at the cases where we immediately add the next domino. These are exceptional cases, where we place both new dominoes. We don't call `addNumberSign()`.

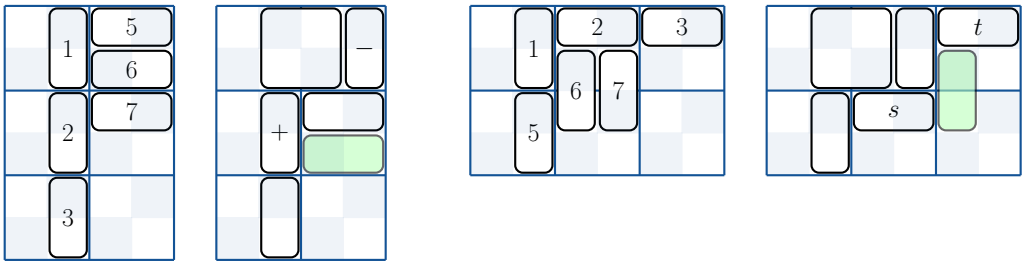
  ▷ Here the corner domino has a + sign, the top domino has a − sign, and there is a blank in the column to the left. We pull the blank (which has an s on the dual side) up to the corner domino with `findRowToAddSignX()`. Now, we fill the box and put the s in the middle domino. The s is now in a new row, so we call `makeSpaceFor()` for it.



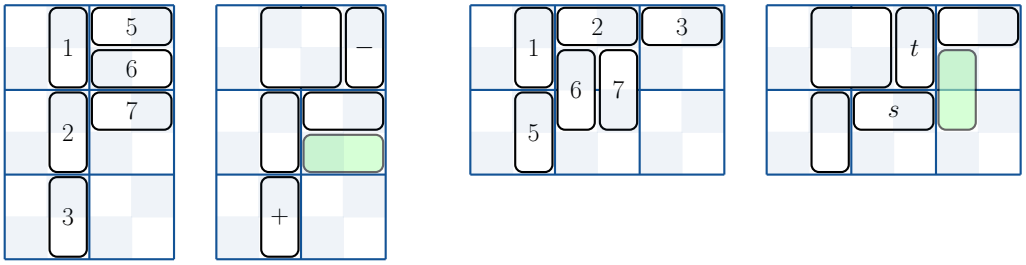
goes to



▷ Here the corner domino has a + sign, the top domino is blank (with dual sign s), there is a blank domino in the column on the side, and the highest such blank domino has dual sign t. We pull the blank (which has the t on the dual side) up to the corner domino with `findRowToAddSignX()`. Now, we fill the box and put the t in the middle domino.



goes to



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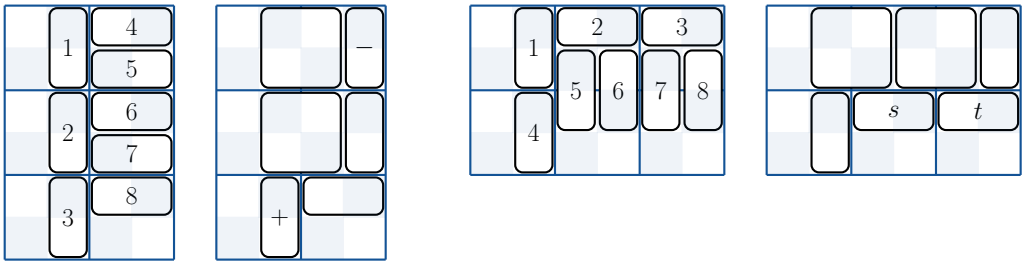
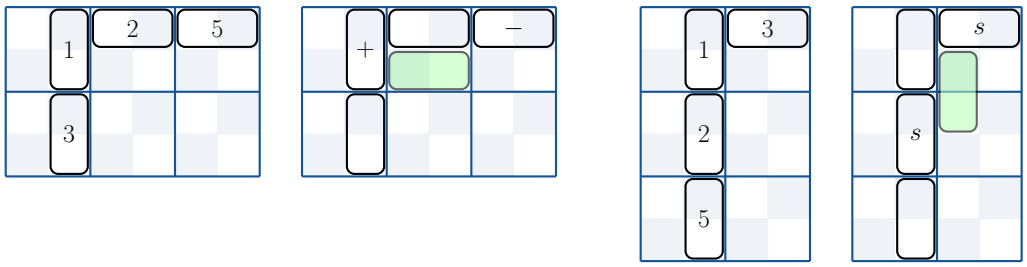


▷ Here the corner domino has a + sign, the top domino is blank (with dual sign s), there is a blank domino in the column on the side, the highest such blank domino has dual sign s, and the row with the top domino also has a − sign in it. We pull up the blank (which has the s on the dual side) up to the corner domino with `findRowToAddSignX()`. Then we pull the minus in to the top domino with `findRowToAddSignX()` on the dual side. (Note, this move has the potential to make a shape change in a broken cycle. We'll show that in the second example.) Finally, we box things up as before, with the s which is currently in the top corner going to the middle. First a basic example.



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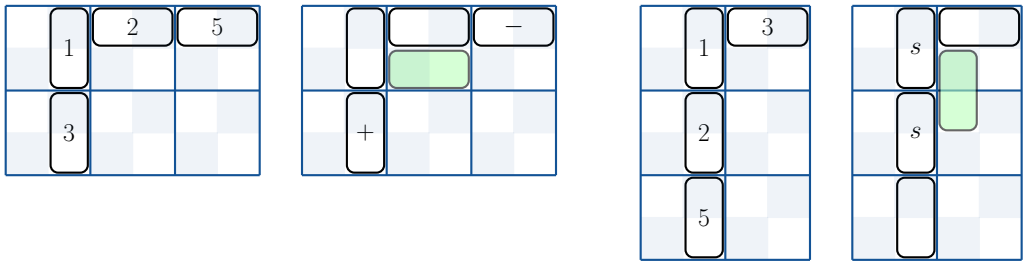

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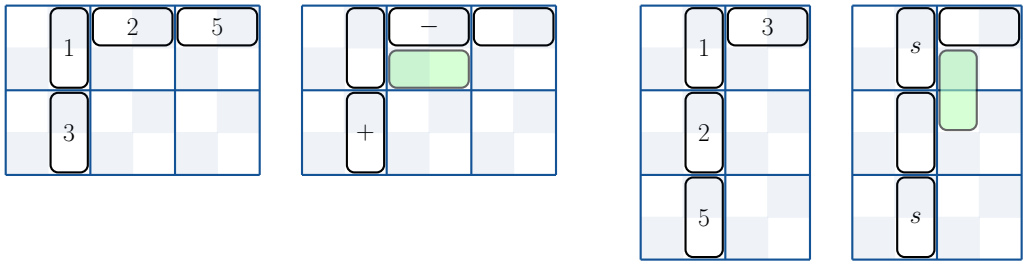

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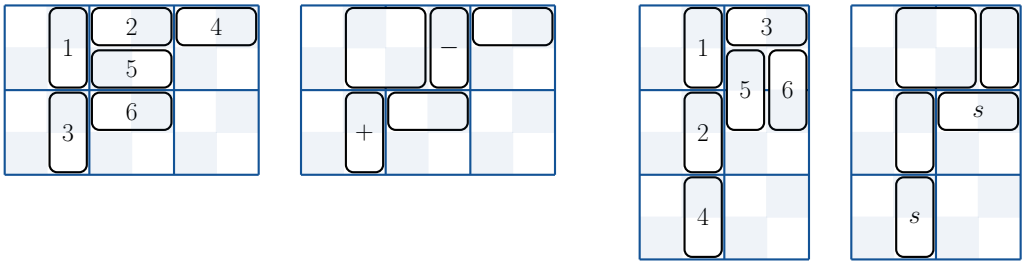
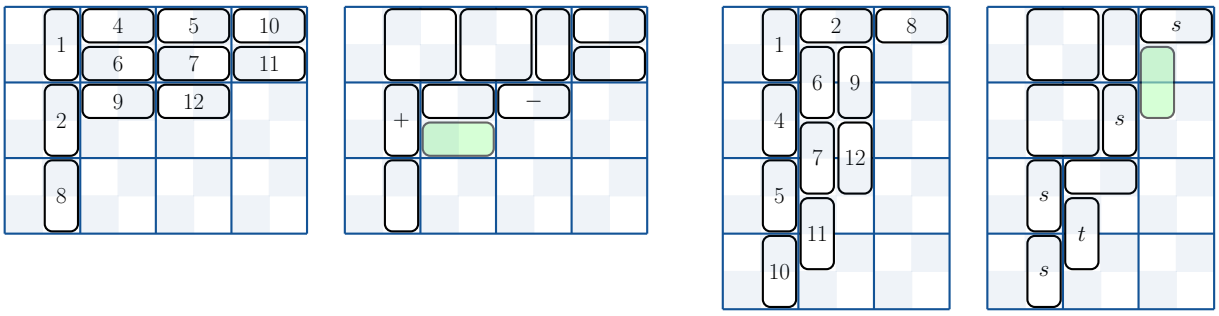


Suppose now the new domino breaks a cycle into two. The second domino will reattach the cycle. However, in this case, when we pull the minus sign in, we may move an s sign into a cycle top, which may move that cycle. The cycle which we move may be the cycle which is broken. In that case, our final result will be that the reattached cycle is in the unboxed state in the left tableaux. (The code so far will have moved the outer parts of the broken cycle in the number tableaux. It then needs to move the inner parts, and to place the second domino of the pair in the unboxed connecting position.) Here is an example. Note, in the third figure, I show the effect of adding the first numbers to the number tableaux.



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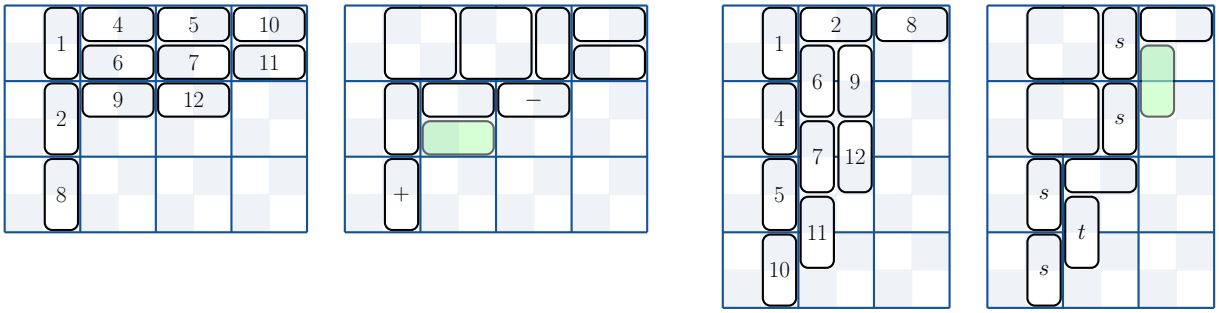

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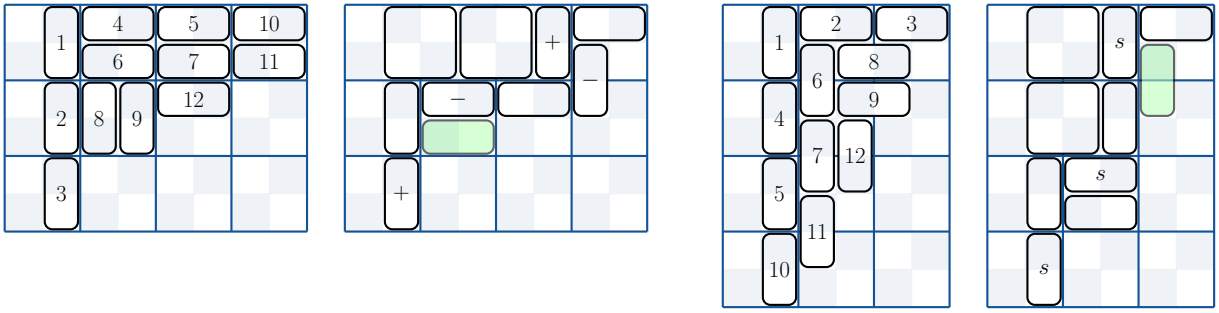

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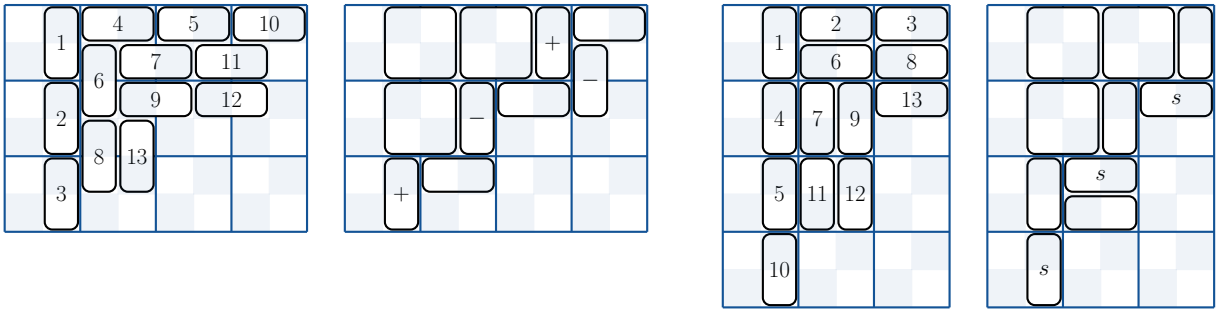
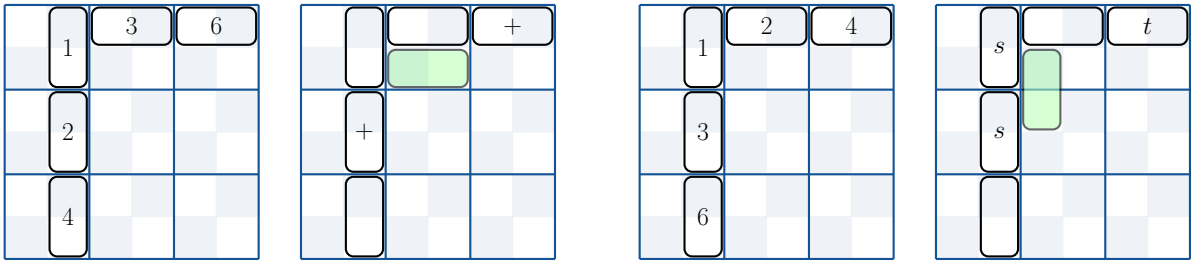


▷ Here the corner domino is blank, there is a (+) sign in the top row, and there is a − sign or another blank in the column below the corner domino. We'll swap the signed domino with the corner domino, using `prepareForSign()` on the dual side. (If we're in the broken cycle situation, this move may make a shape change to the broken cycle.) Then if necessary we'll move a blank up to

the position under the corner domino. Finally, we'll make a box, moving the + sign to the middle. First, a basic example.



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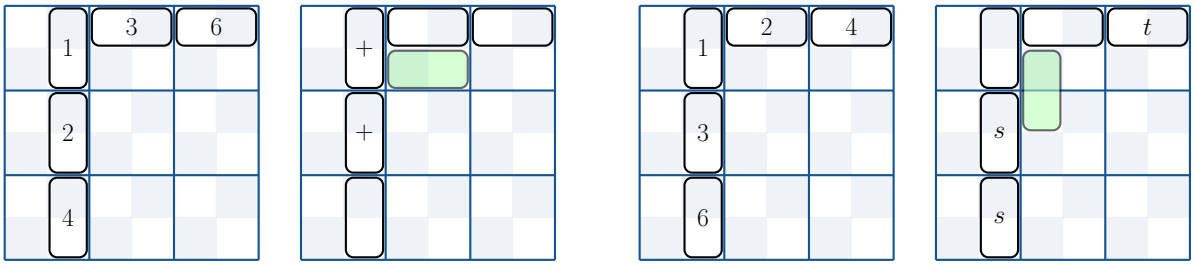

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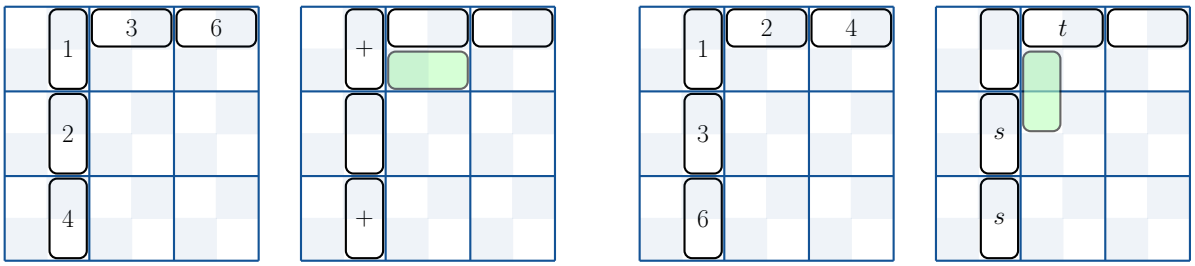

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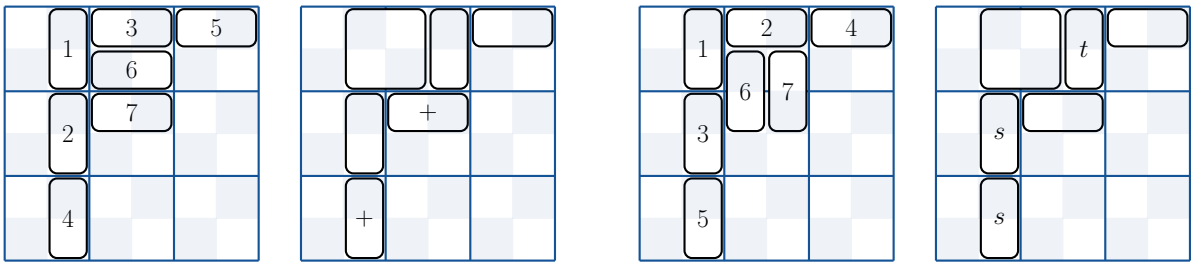
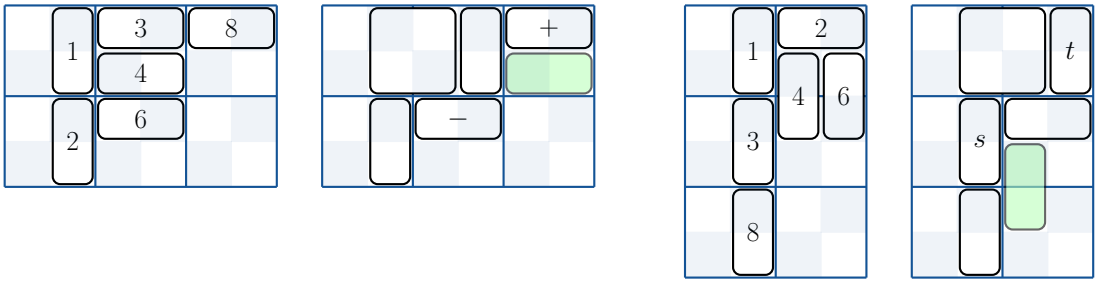
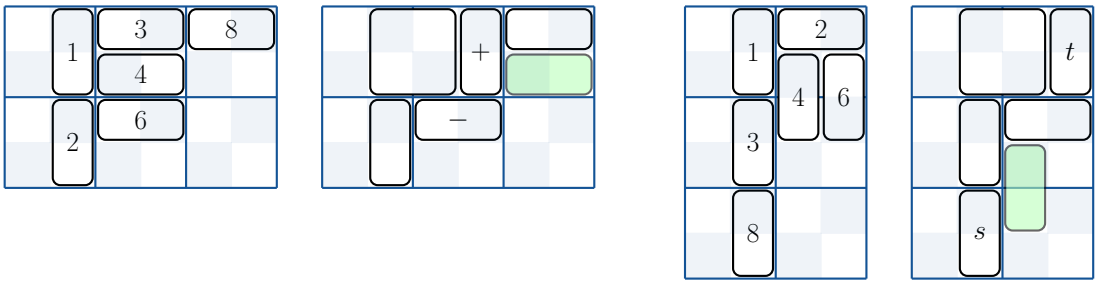


Here is another example, this time with a $-$ sign below.



goes to



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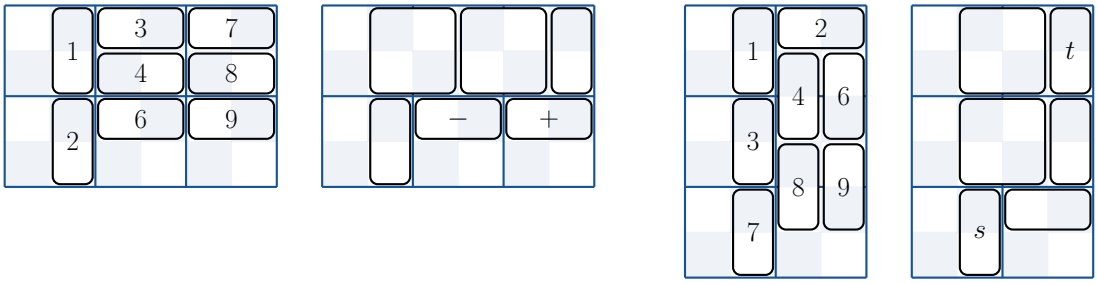
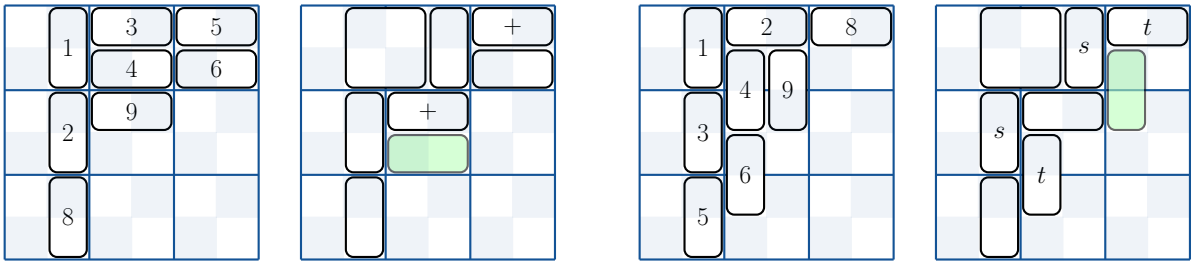


Finally, we'll do a shape change example. Note, in the second figure, I show the effect of adding the first numbers to the number tableaux.



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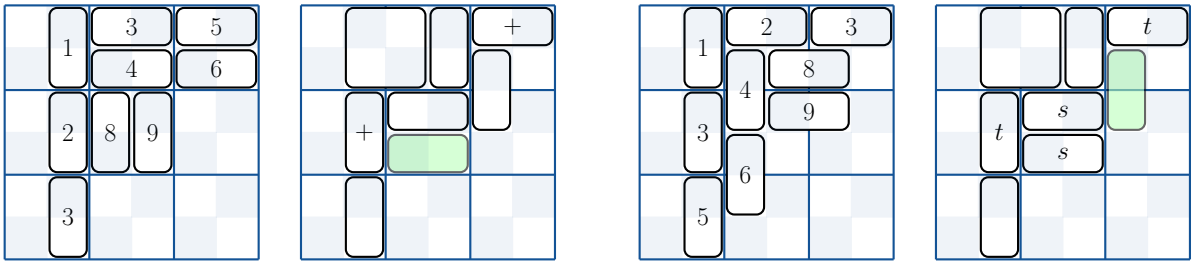

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