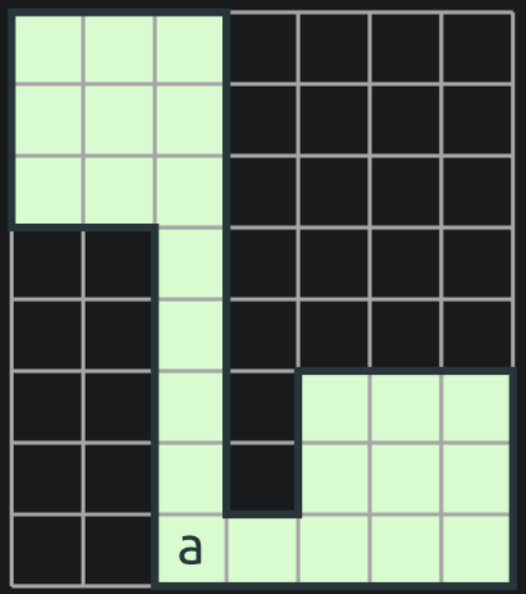
1. Consider the following shape that we want to tile by 1×2 tiles. (This means that the tiles should be inside the green zone and cover the entire green zone without overlaps)

1 / 1 point

Please discuss this quiz here.



Is it possible if we cover the cell "a" by a horizontal tile?

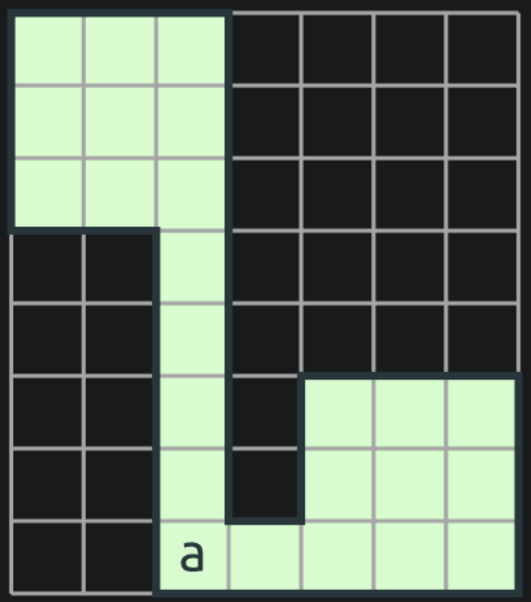
- ○ Yes
- ◉ No

Correct

You are right, it is not possible. Indeed, this horizontal tile covering "a"-cell splits the region into two parts that have odd number of cells, so they cannot be covered.

2. Consider the following shape (the same as in the previous question) that we want to tile by 1×2 domino tiles. (This means that the tiles should be inside the green zone and cover the entire green zone without overlaps).

1 / 1 point



Now we want to tile it by dominos covering "a" by a vertical tile. Is it possible?

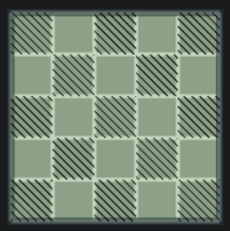
- (●) Yes, it is possible
- ( ) No, it is not possible

Correct
You are right, and such a tiling is easy to find.

3. A cell is *good* if the board without this cell can be tiled by domino 1×2 tiles. What is the number of good cells? (Just write a number in the answer field)

1 / 1 point

(In other words, you want to delete one cell in such a way that the rest can be tiled. How many options do you have? For example, if you delete the left upper corner, you can tile the rest using vertical tiles in the first column and horizontal tiles elsewhere. So the left upper corner is good. Some other cells (e.g., the other corners) are good, but not all. You need to count the good cells.)



13

Correct

The good cells are black cells. Indeed, initially there are 13 black cells and 12 white cells. If we delete a white cell, we have more black cells (13) than white ones (11), so no tiling. If we delete a black cell, the numbers are equal. It is not enough per se to conclude that the tiling exists, but one can use the same snake argument: consider a snake

The deleted cell splits it into two parts of even size that are therefore tileable.