

- (  /1pt) Give a URL link to an existing online puzzle/game similar to your product.
  - <https://www.puzzle-nonograms.com/>
- (  /1pt) Indicate if the existing online puzzle/game does provide solutions to users.
  - The existing online puzzle doesn't offer solutions, but they do offer hints where you can ask for hints on what the color of a chosen tile is
- (  /2pt) The approach to producing the solutions
  - **Start with the highest numbered "line"** and flip in the possible tiles to black
    - Ex: a line with 4 would mean that the center 3 out of 5 tiles will need to be flip
  - **Once there are no more lines that are higher than 3**, go through each line and mark the tiles as white if number conditions are meet
    - Ex: if the number condition for the line is 5 and all 5 tiles on that line are black then the line is done
    - Ex 2: if the line is 3 and three of the five tiles are black then mark the other 2 non-black tiles as white
  - **If a line has a black tile next to a white one** then starting from that black tile add  $n - 1$  numbers of tile ( $n$  being the number condition)
    - Ex: let  $w$  be white and  $b$  be black and  $g$  be gray (unmarked):
      - If  $n$  is 3:  $w \ b \ g \ g \ g \rightarrow w \ b \ b \ b \ w$
      - If  $n$  is 4:  $w \ b \ g \ g \ g \rightarrow w \ b \ b \ b \ b$
  - **Once a line is filed and finish then it's removed from the for loop**
- (  /1pt) Is your solution optimal? Why or Why not?
  - It is somewhat optimal since the "finished" rows and columns are removed from the list and the for loop won't have to include them while looping through
  - However, it's not completely optimal since in the beginning (first few loops through the puzzle) the loop will loop through rows and columns that don't have enough information to solve
- (  /1pt) Give the proved or estimated time complexity
  - Since the solution is going over each row and column in a list using a for loop, the time complexity would be  $O(n)$ .