

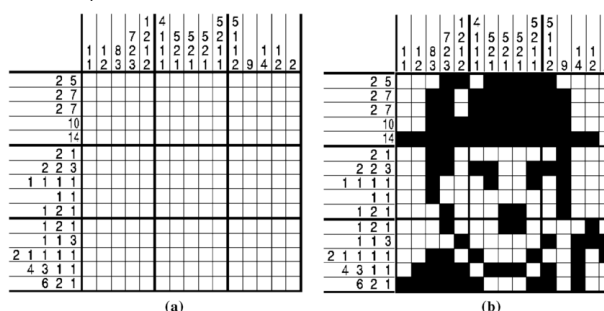
Weekly Challenge 02: Thinking Logically

CS/MATH 113 Discrete Mathematics

Spring 2024

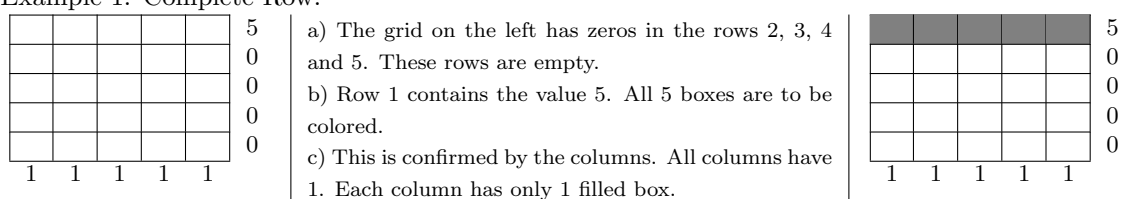
1. Hanjie (also known as Nonogram)

Hanjie is a simple logic puzzle which starts with (a) a blank grid, as shown on the right. The objective is to figure out which of the squares should be colored (filled in solid), and which should be left out based on the clues given for each column and row. The resulting pattern (b) “Charlie Chaplin” in our case, makes up a picture.

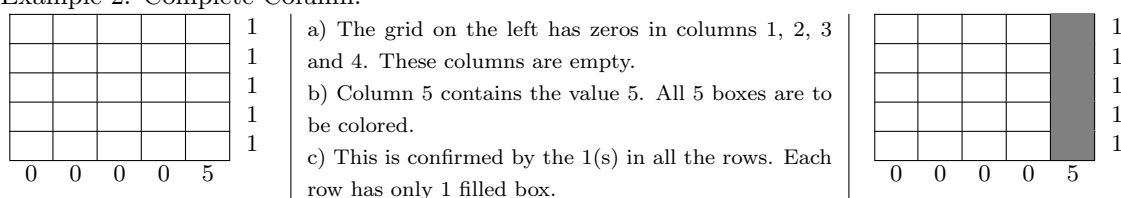


Tutorial: Here are some simple 5×5 puzzles as a tutorial.

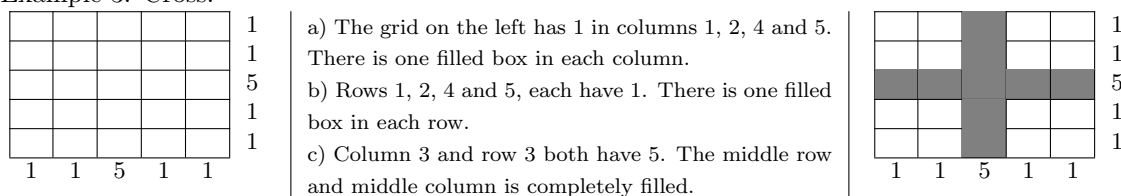
Example 1: Complete Row.



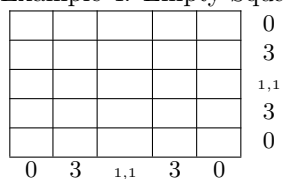
Example 2: Complete Column.



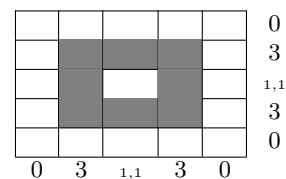
Example 3: Cross.



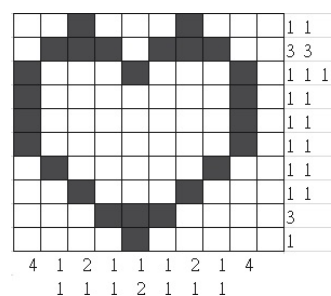
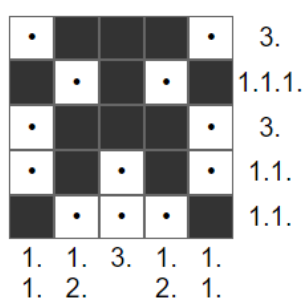
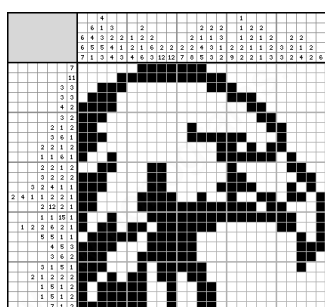
Example 4: Empty Square.



- a) Two numbers, e.g. 1,1, indicate two boxes in the corresponding row and column, with some space between them.
- b) Rows 1 and 5, and columns 1 and 5 are zero. These are empty.
- c) Row 3 and column 3 are 1,1. There are two boxes, each of length 1, with at least one space between them.

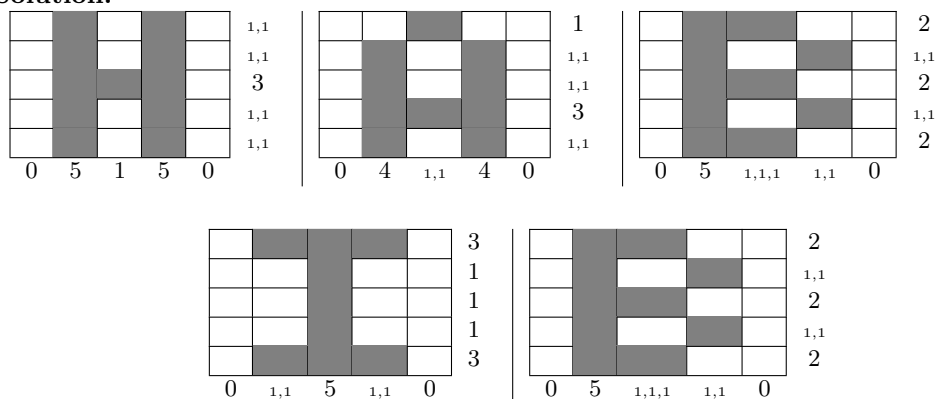


Here are some interesting examples.



- (a) In the space below, fill in the cells to solve the five nonograms.. See above to see how to fill a cell.

Solution:



- (b) What is the hidden message in the above 5 nonograms?

Solution: HABIB

- (c) How many different nonograms can be made from a 5×5 grid without any clues? Please explain your answer. (Explanation shouldn't be too long. 1-2 line(s) are sufficient enough.)

Solution: The numbers of nonograms made increases with the exponent of 2 as 2^n . Since a 5×5 grid has 25 squares the number of possible nonograms would be $2^{25} = 33554432$.

- (d) How many different nonograms can be made from a 5×5 grid with clues? Please explain your answer. (Explanation shouldn't be too long. 1-2 line(s) are sufficient enough.)

Solution: When clues are given there can only be one nonogram which satisfies all the clues, hence only 1 nonogram can be made with clues.