

# Home Work n°4:

## Constraint Satisfaction Problems

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1. The variables in the upper middle box in the blue circle and their domains:
  - a.  $A4 = \{1,4,7,9\}$
  - b.  $A6 = \{1,4,7,9\}$
  - c.  $B5 = \{1,4,7,9\}$
  - d.  $C5 = \{1,4,7,9\}$
2. The reduced domain obtained by enforcing the arc constraints with the entire puzzle:
  - a.  $A4 = \{4,9\}$
  - b.  $A6 = \{1,4,7\}$
  - c.  $B5 = \{4,7\}$
  - d.  $C5 = \{7,9\}$
3. Using minimum remaining value heuristic, we will choose the **most constrained variable**, i.e. the one with the fewest legal moves. In this case A4, B5 and C5 have the fewest moves. To break the tie, we can now choose **the most constraining variable**.
  - a. A4 has minimum neighboring cells empty (9) and therefore not most constraining.
  - b. B5 and C5 have equal number of empty neighboring cells (12).
  - c. However, B5 constraints nine variables in the grid with choice 1 (4) and nine variables with choice 2 (7). Whereas C5 constraints seven variables with choice 1 (7) and four variables with choice 2 (9).
  - d. Thus **B5** is the most constraining of the two and hence is our choice.
4. Least constraining value is the one that rules out the fewest values for the remaining variables.
  - a. Choosing  $A4 = 4$  will constrain A6 and B5
  - b. Choosing  $A4 = 9$  will constrain only C5Thus **A4 = 9** will be the least constraining choice.
5. Number of puzzles solved using **AC-3 = 3**. Refer python code for details.
6. Refer python code and output.txt.