

(n) + (matrix)

CP - MCQ1

January 13, 2025

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### Instructions

- Each question has one and only one correct answer. Circle the corresponding letter.
- Grading: correct answer (1 pt), incorrect answer (-0.5 pt), no answer (0 pt).

1. A problem is classified as **NP-Hard** when:

- A. its resolution is always possible in polynomial time.
- ☒ B. its complexity increases exponentially with the size of the problem instance.
- C. there is no optimal solution.
- D. it is impossible to model the problem as constraints.

2. A ~~constraint network~~ consists of the following elements:

- A. variables, domains, and objective functions.
- B. only variables and domains.
- C. constraints and search heuristics.
- ☒ D. variables, domains, and constraints.

3. The separation between the model and the solver in CSP illustrates the principle of declarativity because:

- ☒ A. it allows the solver to impose specific constraints on the model.
- B. it requires the solver to know the implementation details of the model.
- C. it enables specifying "what to solve" independently of "how to solve it."
- D. it guarantees that the model is automatically optimal.

4. CSP is particularly suitable for:

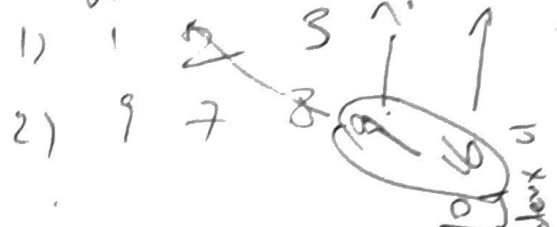
- ☒ A. simple linear problems.
- ☒ B. complex combinatorial problems such as planning and optimization.
- C. intensive numerical calculations.
- D. solving statistical problems.

5. The size of the search space in a CSP is given by:

1)  $d_1 \cdot d_2 \cdot \dots \cdot d_n$  GT

2) 3) no need to search for all n

8, 5



Lecture 10

$X = \{x_{ij} \mid 1 \leq i \leq n, 1 \leq j \leq n\}$   
all in row  $i$  and column  $j$

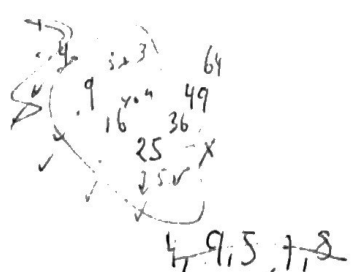
$D(x_{ij}) = \{1, 2, \dots, n\}$   
 $C = \{ \text{row constraints} \cup \text{column constraints} \cup \text{sub-grid constraints} \}$   
where  $1 \leq a, b \leq n$

The block  $(a,b)$  contains cells  $(i,j)$  s.t.  $i \in [a, (a-1)n+1, \dots, a \cdot n]$ ,  $j \in [1, (b-1)n+1, \dots, b \cdot n]$

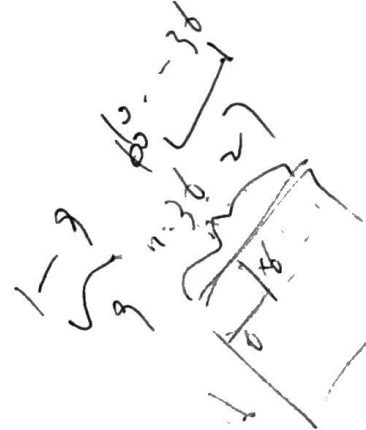
All variables in that block must take different values:  $\forall a, b \in n, \forall (i,j) \neq (k,l) \text{ in the same block } x_{ij} \neq x_{kl}$

The final choice is answer B

Commentaire



1-9(+) 26  
(35)



- A.  $|X|^{|D|}$ .
  - ☒ B.  $|D|^{|X|}$ .
  - C.  $|D| + |X|$ .
  - D.  $|C| \times |D|$ .
6. Backtracking (BT) is inefficient when:
- A. domains are small and there are few constraints.
  - B. variables have compatible values.
  - ☒ C. domains are large or constraints are numerous.
  - D. arcs are already consistent.
7. The primary goal of constraint propagation is to:
- A. explore all possible instantiations.
  - ☒ B. reduce domains to simplify the search.
  - C. eliminate valid solutions.
  - D. add additional constraints.
8. The main characteristic of the AC3 algorithm is:
- ☒ A. it makes every arc in the constraint graph consistent.
  - B. it directly finds a solution to the CSP.
  - C. it never modifies the variable domains.
  - D. it guarantees an optimal solution.
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9. Forward Checking (FC):
- ☒ A. reduces the domains of uninstantiated variables after each assignment.
  - B. maintains arc consistency after each instantiation.
  - C. is more expensive than the MAC algorithm.
  - D. completely avoids backtracking.
10. Maintaining Arc Consistency (MAC) applies the algorithm:
- ☒ A. AC3 at each step of the search.
  - B. Forward Checking (FC) only before instantiation.
  - C. Branch-and-Bound (B&B) during the search.
  - D. no constraint propagation.