Constraint Satisfaction

Problem Definition (Map Coloring)

- Set of variables with domains: \( A \in \{\text{red, green, blue}\}, B \in \{\text{red, green, blue}\}, \ldots \)
- Constraints on variable assignments: \( A \neq B, B \neq C, \ldots \)
- Goal: variable assignments satisfying the constraints

Example: N-queens problem

Approaches

- Constraint Graph
- Backtracking Search
- Constraint Propagation (Forward Checking, Arc Consistency)

Heuristics

- Choose a variable with fewest values (after propagating the constraints).
- Choose a variable that appears in most constraints (minimizes the number of future steps).
- After selecting a variable choose a value that minimizes the constraints on the other variables (compare how \( C = \text{green} \) and \( C = \text{blue} \) affects \( E \)).