Exercise 12, Discrete Mathematics for Bioinformatics

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12.1 Inverse Queens Problem

a) Variables

$$x_i \in \{1, ..., n\} \quad \text{for } 1 \leq i \leq n$$

Constraints

$$x_i = x_j \vee |x_i - x_j| = |i - j| \quad \forall i \neq j$$

b) Solve for $n = 4$ and $D_1 = \{2\}$.

Forward checking:

- $x_1 = 2 \Rightarrow D_2 = \{1, 2, 3\}, D_3 = \{2, 4\}, D_4 = \{2\}$
  - $x_2 = 1 \Rightarrow D_3 = \{2\}, D_4 = \{\}$
  - $x_2 = 2 \Rightarrow D_3 = \{2\}, D_4 = \{2\}$
    - $x_3 = 2 \Rightarrow D_4 = \{2\}$
      - $x_4 = 2 \Rightarrow$ Solution found: $(2, 2, 2, 2)$

12.2 Task Scheduling