### **Integer Programming (IP) Approach**

Sudoku can also be modeled as an **Integer Programming** problem:

* **Decision Variables**:
* **Objective Function**:
  + Since Sudoku is a feasibility problem (not an optimization), the objective is simply to find a feasible solution that satisfies all constraints.
* **Constraints**:
  1. **Each cell has exactly one number**:
  2. **Each number appears exactly once in each row**:
  3. **Each number appears exactly once in each column**:
  4. **Each number appears exactly once in each 3x3 block**:
  5. **Pre-filled cells constraint**: For given cells, set for the pre-filled numbers.