Learning Objectives

- To model a problem as a constraint satisfaction problem
- To practice running backtracking search, forward checking, AC-3, and MRV

Q1. Course Scheduling

Suppose we have 4 classrooms (Room A, B, C, D) to fit 4 courses' office hours (112, 122, 151, 281). Each of the classes should take place in different rooms, and each course should use exactly 1 room. Additionally, the expected number of students for the course should not exceed the capacity of the room. Finally, some of the professors have preferences about the rooms they teach in.

- 112 wants to be in rooms A or D
- 281 wants to be in rooms C or D

Rooms	Capacities
A	50
B	35
C	24
D	40

Course	OH size
112	45
122	30
151	15
281	20

(a) What are the variables? What are the values?

(b) What are the unary constraints in this problem? What are the binary constraints? Draw the constraint graph.

(c) When we create the problem, each variable has a domain of size 4. Enforce unary constraints to remove values that could never be assigned to each variable.

Variables	Domains after removal from unary constraints

Now, use your answers from the previous part to run backtracking search.

(d) First run backtracking search with no filtering (i.e., no Forward checking or AC-3).

(e) Perform the backtracking search with Forward checking.

(f) Perform the backtracking search with AC-3.

(g) Perform the backtracking search with AC-3 and MRV (minimum remaining values).