Class Activity 3

1. Exercise 1:
2. Complete the formulation of this problem as a Constraint Satisfaction Problem (CSP) in terms of variables, domains, and constraints (both unary and binary). Constraints should be expressed implicitly using mathematical or logical notation rather than with words.

Variables: A, B, C, D, E.

Domains: Type of runway (international or domestic), time slots {1, 2, 3, 4}

Constraints:

B(landing) = 1

D(landing) ≥ 3

A(landing) ≤ 2

D(landing) < C(landing)

A ≠ B ≠ C ≠ D ≠ E

1. With the addition of the two constraints above, we completely reformulate the CSP. You are given the variables and domains of the new formulation. Complete the constraint graph for this problem given the original constraints and the two added ones.

Variables: A, B, C, D, E.

Domains: Time slots {1, 2, 3, 4}

1. Discussion on code:
2. How are variables and domains implemented?

The variables are defined as A, B, and C, and their domains are given as a list of numbers.

1. How are constraints implemented? Specify the constraints.

There are three constraint methods that take variables and values as parameters, and output different results. The constraints are defined in a list that contains the variables, and the desired constraint method to be performed.

1. How are the heuristics (e.g., most constraining variable and least constraining variable) implemented?

The heuristic values are defined by a method called backtrack that assigns heuristics to the variables. These are then sorted to determine the highest and lowest heuristic variables.

1. Run the implementation and show a snapshot of the code running along with the result using the backtrack algorithm without and with the heuristics?

Text

Description automatically generated