DECISION ANALYTICS.

Lab05: The Zebra Puzzle

BACKGROUND.

In Lecture 9 we looked at the following problem:

- There are five houses.

- The Englishman lives in the red house.

- The Spaniard owns the dog.

- Coffee is drunk in the green house.

- The Ukrainian drinks tea.

- The green house is immediately to the right of the ivory house.

- The Old Gold smoker owns snails.

- Kools are smoked in the yellow house.

- Milk is drunk in the middle house.

- The Norwegian lives in the first house.

- The man who smokes Chesterfields lives in the house next to the man with the fox.

- Kools are smoked in the house next to the house where the horse is kept.

- The Lucky Strike smoker drinks orange juice.

- The Japanese smokes Parliaments.

- The Norwegian lives next to the blue house.

- **Now, who drinks water? Who owns the zebra?**

Task 1.

Write a Python program that creates a CP-SAT model and adds all Boolean variables necessary for representing the predicates required for this problem to this model.

Task 2.

Formulate the sentences of the logic puzzle using first-order logic and add them to the CP-SAT model as constraints.

Task 3.

Formulate the implicit constraints using first-order logic and add them to the CP-SAT model as constraints.

Task 4.

Implement a CpSolverSolutionCallback that prints out assignments of nationality, colour, pet, drink and cigarette for each house.

Task 5.

Solve the puzzle and print out the solution.