CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Computing@CIT

DECISION ANALYTICS.

Lab04: The Zebra Puzzle

BACKGROUND.

<u>In Lecture 4 we looked at the following problem:</u>

- 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.