Cairo University
Faculty of Computers and Artificial intelligence
AI-311 – Intro to Logic 2024-2025

Project

Delivery Notes:

- This is a group assignment of 3-4 members **(at most)**
- All students should work and fully understand everything in the code.
- Due date is on Dec 27st until 11:55 pm
- No late submission is allowed.
- No submission through e-mails.
- The submitted files should be named FirstStudentID_SecondStudentID.ipynb
- **Do not send your code** to anyone, so that no other student would take your files and submit it under their names.
- **In case of Cheating, you will get a zero grade whether you give the code to someone or take the code from someone or from the Internet**

Project Details:

The Zebra Puzzle, often referred to as Einstein's Puzzle or Einstein's Riddle, is a classic exercise in logic. Your task in this project is to solve a simplified version of the Zebra Puzzle by applying logic principles and techniques. The aim is to demonstrate your understanding of logical representation and inference algorithms in Python.

Puzzle:

Let's meet the Potters: Mummy, Daddy, their son Peter, a schoolboy, and his younger sister Betty. There is also Aunt Polly, who often visits them. Each family member has his or her hobbies, favorite desserts, and dreams!

Conditions of the puzzle:

1. Mummy Potter attends yoga classes on Mondays and Thursdays.
2. A person loving ice cream dreams of visiting Paris.
3. Betty likes only marmalade.
4. Mummy eats only marshmallows.
5. The Potters have three money boxes for their dreams at their home: one for a trip to the sea, one for a ticket to the Swan Lake ballet, one for a new album for the collection of coins.
6. Aunt Polly has a sewing machine and a collection of sewing materials at home. She made a ballet suit for Betty for her classes.

7. Peter often goes fishing with his dad, but he quickly becomes bored of it and begins to walk down the shore looking for rare coins for his collection.
8. Peter doesn't like anything with cream.
9. Peter and Betty's parents have made the same New Year wish both.
10. On holidays, Mummy prepares the family's favorite desserts: Napoleon cake, marmalade, and waffles.

Questions:

1. Who likes the Napoleon cake?
2. Who dreams of going to Paris?

Instructions

1- You are required to submit a Python Jupyter Notebook containing the following:

a. The **type of logical representation** you used (Propositional – First order logic) and **all the rules** in your knowledge base.

b. **The code** you implemented to answer the riddle questions.

c. The output of the riddle questions should be run and **shown in the cell output**.

2- You can implement the inference algorithms **yourself** or you can use the algorithms implemented **in these files**. **You can't use any other logic library**. Also, feel free to modify, enhance or change any of the algorithms implemented in the files if you see any need to do that.

3- For extra information, you can read chapter 7, 8 and 9 in the following book. You can also refer to this notebook as documentation of how to use the code implemented in the files.