

## CS349 - ARTIFICIAL INTELLIGENCE II

### ASSIGNMENT-1: PROLOG

(Read all the instructions carefully & adhere to them.)

Date: 2 September 2023

Deadline: 12 September 2023

Total Credit: 20

#### Instructions:

1. The assignment should be completed and uploaded by 9 September 2023, 11:59 PM IST.
2. Markings will be based on the correctness and soundness of the outputs. Marks will be deducted in case of plagiarism.
3. Proper indentation and appropriate comments are mandatory.
4. Make proper documentation of all results and observations with their analysis.
5. You are supposed to make a group of at most three members.
6. You should zip all the required files and name the zip file as roll\_no\_of\_all\_group\_members.zip, e.g., 2101ai01\_2102ai02\_2101ai03.zip.
7. Upload your assignment (the zip file) in the google classroom with the class code: jtuplux
8. Course Webpage: <https://ai-nlp-ml-iitp.github.io/ai-cs349/>
9. For any queries regarding this assignment, you can contact:  
Priyanshu Priya ([priyanshu528priya@gmail.com](mailto:priyanshu528priya@gmail.com)) or  
Manisha Boorja ([manishaboorja@gmail.com](mailto:manishaboorja@gmail.com))

#### Questions

1. Write a program in Prolog to represent the following knowledge and find the answer to the given questions.
  - a. *Knowledge*

**Scenario:** Yesterday Ram went to the Bakery and bought two dozen bagels and a loaf of bread.

**Facts:**

Human	Ram	Sita		
Weekdays	Monday	Tuesda y	Wedne sday	Thursd ay

Items	Bagels	Bread	Scones	Banana
Rack	1	2	3	4
Growing_Naturally	Bananas			
Shopping cart	Ram has a loaf of bread	Ram has two dozen bagels		
Money	Cash	Card		
Yesterday	Wednesday			

### Rules:

All things are persons if they are humans.  
 All Customers are persons who buy from Bakery.  
 All items are in Bakery.  
 All Bakery items have a price.  
 All Bakery items are edible.  
 Every Bakery item has a location.  
 Something is bought if a customer purchased an item from Bakery.  
 A Customer has an Item in his basket if that item is their shopping cart.  
 There is a payment if an item is bought with cash or a card.  
 There is a card payment if an item is bought with a card.  
 There is a cash payment if an item is bought with cash.  
 There is At least some item if a customer bought it from Bakery and has that amount on their shopping cart.  
 There is an item that Bakery makes if it is in Bakery, and it is not sold to Bakery.  
 A customer has cash or a card if the customer wants to go to Bakery.  
 A person has less money after going to Bakery if that person is a customer and makes a payment with cash or card.  
 An Item is eaten by the customer if edible and has it in their shopping cart.  
 All things are for selling if they are in Bakery.

### Question:

1. *Does Ram now have at least two bagels?*
2. *Did Ram buy some bread?*
3. *Are the bananas made in the bakery?*

4. *What is Ram going to do with the bagels?*
  5. *Does Bakery sell scones?*
  6. *Did Ram bring some money or a credit card to the bakery?*
  7. *Does Ram have less money after going to the bakery?*
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2. Write a program in Prolog to represent the following knowledge and find the answer to the given questions.
    - a. **Knowledge:** On a river bank, there are 3 cannibals and 3 missionaries. Here is a boat with 2 places for crossing the river. If on a bank, there remain more cannibals than missionaries, then it is dangerous since the cannibals may eat them.  
**Question:** How could they all cross the river without being in danger?

Send a document writing how you approached the knowledge and converted the rules and facts into first-order logic in order to answer the questions.