1 Directed Questions

In propositional definite clause logic (PDCL),

- What is an atom? Give the definition and an example.
  
  **Answer:** An atom is a symbol starting with a lower case letter.
  
  Example: `ai_is_fun`

- What is a body? Give the definition and an example.
  
  **Answer:** A body is an atom or is of the form \( b_1 \land b_2 \) where \( b_1 \) and \( b_2 \) are bodies.
  
  Example: `students_are_motivated \land ai_is_fun`

- What is a definite clause? Give the definition and an example.
  
  **Answer:** A definite clause is an atom or is a rule of the form \( h \leftarrow b \) where \( h \) is an atom and \( b \) is a body. (Read this as \( h \) if \( b \).)
  
  Example: `students_are_successful \leftarrow ai_is_fun \land students_are_motivated`

- What is a knowledge case? Give the definition and an example.
  
  **Answer:** A knowledge base is a set of definite clauses.
  
  Example: `ai_is_fun`
  `students_are_motivated`
  `students_are_successful \leftarrow ai_is_fun \land students_are_motivated`

- What is an interpretation of a knowledge base \( KB \)? Give the definition and an example.
  
  **Answer:** An interpretation \( I \) is an assignment of truth values to each atom in each clause of the knowledge base. For the knowledge base above, one interpretation is:
  
  `ai_is_fun = true`
  `students_are_motivated = false`
  `students_are_successful = true`
  
  (Note that there’s nothing in the definition of an interpretation that says clauses have to be true under the interpretation; that part is captured by a *model*; see below)

- What is a model of a knowledge base \( KB \)?
  
  **Answer:** A model of a set of clauses is an interpretation in which all the clauses are true.
  
  For the knowledge base above, the only model is:
  
  `ai_is_fun = true`
  `students_are_motivated = true`
  `students_are_successful = true`
2 Syntax

Which of the following rules are syntactically invalid in propositional definitive clause logic, and why?

1. bikeCrashed ← cycledDrunk
   **Answer:** Syntactically valid.

2. goByBus ∨ goByCar ← bikeBroke
   **Answer:** Syntactically invalid: the head of a clause has to be an atom.

3. goByBus ← ¬haveGas ∨ bikeBroke
   **Answer:** Syntactically invalid: atoms in a clause’s body can only be connected by a ∧, and you can’t have negation, either.

3 Learning Goals

You can:

- Model a relatively simple domain with propositional definite clause logic (PDCL)