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ADVANCED PRESENTATION AND REASONING
Assessment Task 4

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Part I. Conceptual Understanding (20 points)

1. Define non-monotonic reasoning in your own words.

Non-monotonic reasoning is a type of logical reasoning where conclusions can change when new information is introduced. It allows systems to withdraw or revise previous conclusions if new facts contradict earlier assumptions.

2. How does non-monotonic reasoning differ from monotonic reasoning?

In monotonic reasoning, adding new information never changes existing conclusions; once something is true, it stays true. In contrast, non-monotonic reasoning allows conclusions to be revised or reversed when new evidence arises.

3. Give a real-life situation where a conclusion must change after new information is added.

At first, you might conclude that it will be sunny today because the sky is clear in the morning. However, if later you learn there's a storm warning, you must change your conclusion, it might rain after all.

4. What is a default rule? Provide one example.

A default rule is a general assumption made when there is no information to the contrary. For example, "Birds normally can fly." This rule holds unless an exception, such as "penguins cannot fly," is introduced.

5. How do argumentation frameworks help AI systems decide between conflicting rules?

Argumentation frameworks help AI systems evaluate and compare conflicting arguments by determining which one is stronger or more specific. The system can then "defeat" weaker arguments, allowing it to make consistent and justified conclusions even when knowledge conflicts.

Part II. Laboratory Application (40 points)
Task 1: Belief Revision Simulation (20 points)
Python Code Example:

```
# Belief Revision Simulation
# Rule: "If an animal is a bird, assume it can fly."

def reasoning_system():
    print("=== Belief Revision System ===")
    animal = input("Enter an animal name: ").strip().lower()

    # Step 1: Initial assumption
    print("\nStep 1: Assuming all birds can fly.")
    birds = ["sparrow", "eagle", "pigeon", "penguin", "ostrich"]

    if animal not in birds:
          print(f"Step 2: {animal.capitalize()} is not in the known bird
list.")
           print(f"Conclusion: Not enough data to assume if {animal} can
fly.")
        return

    # Step 2: Apply the default rule
     print(f"Step 2: {animal.capitalize()} is a bird. By default, it can
fly.")

    # Step 3: Check for exceptions
    exceptions = ["penguin", "ostrich"]
    if animal in exceptions:
         print(f"Step 3: New information found — {animal.capitalize()} is
an exception.")
        print(f"Revising belief: {animal.capitalize()} cannot fly.")
    else:
        print(f"Step 3: No new information contradicts the rule.")
        print(f"Final conclusion: {animal.capitalize()} can fly.")

reasoning_system()
```

Task 2: Argumentation Framework (20 points)
Scenario:

- Rule 1: Birds can fly.
- Rule 2: Penguins are birds that cannot fly.
- Fact: Tweety is a penguin.

Arguments:

- Argument A: Birds can fly.
- Argument B: Penguins are birds that cannot fly.

Conflict Resolution:

Argument B defeats Argument A because it is more specific. Specific knowledge (exceptions) overrides general rules.

```
[Argument A] Birds can fly.  ← defeated by  [Argument B] Penguins cannot
fly.
                        ↑
            [Fact] Tweety is a penguin.
Result: Argument B prevails → Tweety cannot fly.
```

Part III. Reflection and Discussion (20 points)

Prompt:

"Think of a time when you changed your conclusion after learning new information. How is this similar to non-monotonic reasoning in AI?"

Answer:

There was a time when I thought my friend had ignored my message because they were upset with me. Later, I found out that their phone had been broken for a week. After learning that new information, my conclusion completely changed, they weren't upset after all. This experience is similar to non-monotonic reasoning in AI because both involve revising conclusions when new facts arise. Like AI systems that withdraw previous assumptions after discovering exceptions, I had to update my beliefs based on the latest information. It shows how reasoning, whether human or artificial, must stay flexible and open to change to remain accurate and fair.