



ADVANCED PRESENTATION AND REASONING
Assessment Task 3

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Individual Case Study: Who Gets the Scholarship?
Scenario

The Dean's Office has rules:

1. If a student has high grades, is a student leader, and applied, then they are Eligible.
2. If a student is Eligible, then they get a Scholarship.
3. If a student has a Scholarship, then they receive FinancialSupport.

Facts:

- Juan: HighGrades, Applied.
- Maria: HighGrades, DidNotApply.
- Carlos: StudentLeader, NoHighGrades.
- Ana: HighGrades, StudentLeader, Applied.

Part 1 – Unification (5 points)

Unify the rule $\text{Eligible}(x) \rightarrow \text{Scholarship}(x)$ with the fact $\text{Eligible}(\text{Ana})$.

Substitution set: $\{ x / \text{Ana} \}$

Part 2 – Forward Chaining (10 points)

For Ana:

- $\text{HighGrades}(\text{Ana}), \text{StudentLeader}(\text{Ana}), \text{Applied}(\text{Ana}) \rightarrow \text{Eligible}(\text{Ana})$
- $\text{Eligible}(\text{Ana}) \rightarrow \text{Scholarship}(\text{Ana})$
- $\text{Scholarship}(\text{Ana}) \rightarrow \text{FinancialSupport}(\text{Ana})$

New facts: $\text{Eligible}(\text{Ana}), \text{Scholarship}(\text{Ana}), \text{FinancialSupport}(\text{Ana})$

For Juan:

- Missing StudentLeader, so not eligible. No new facts.

Maria: Did not apply, so not eligible.

Carlos: No high grades, so not eligible.

Part 3 – Backward Chaining (10 points)

Goal: $\text{Scholarship}(\text{Maria})$

- To prove $\text{Scholarship}(\text{Maria})$, need $\text{Eligible}(\text{Maria})$.



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- To prove Eligible(Maria), need HighGrades, StudentLeader, Applied.
- Maria has HighGrades but did not apply, and not leader.
- Cannot prove Eligible(Maria). Therefore Scholarship(Maria) fails.

Goal: FinancialSupport(Ana)

- To prove FinancialSupport(Ana), need Scholarship(Ana).
- To prove Scholarship(Ana), need Eligible(Ana).
- Ana has HighGrades, StudentLeader, and Applied, so Eligible(Ana) is true.
- Therefore Scholarship(Ana) and FinancialSupport(Ana) are true.

Part 4 – Validity Check (5 points)

Truth table for $(\text{HighGrades} \wedge \text{Leader} \wedge \text{Applied}) \rightarrow \text{Eligible}$:

HighGrades	Leader	Applied	Antecedent A	Eligible (E)	$A \rightarrow E$
0	0	0	0	0	1
0	0	1	0	0	1
0	1	0	0	0	1
0	1	1	0	0	1
1	0	0	0	0	1
1	0	1	0	0	1
1	1	0	0	0	1



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1	1	1	1	0	0
1	1	1	1	1	1

Testing students:

- Juan: Antecedent false → not eligible.
- Maria: Antecedent false → not eligible.
- Carlos: Antecedent false → not eligible.
- Ana: Antecedent true → Eligible(Ana).

Part 5 – Reflection (Bonus 5 points)

Logical reasoning gives AI systems a clear, testable way to combine facts and rules to reach conclusions. It makes decision-making predictable and explainable. In real life, it helps people and institutions apply consistent criteria, like scholarship rules, ensuring fairness. By making rules explicit, errors and biases become easier to detect and correct.