**Intelligent Systems**

**Exercise 13. Reasoning in First-Order Predicate Logic**



# Exercise description

The objective of this exercise is to apply the concepts of reasoning in First-order Predicate Logic.

**Team members**

Write the student id, name, and campus of each member in a different line.

1:

2:

3:

1. Given the following piece of knowledge in predicate logic, transform each sentence to **conjunctive normal form** (CNF) to get an equivalent set of **clauses**.

Number the clauses with the number of the sentences that produce them. If a sentence produced more than one clause, use alphabet letters to complete their numbers. For example, if sentence 1 produces two clauses, the first one should be numbered 1a, while the second one should be numbered 1b.

1. *∀ x (H(x) → W(x))*
2. *∀ x ∀ y (A(x, y) ∧ C(y) → ¬ ∃ z (A(x, z) ∧ O(z)))*
3. *∀ x (L(x) → ¬ ∃ y (A(x, y) ∧ W(y)))*
4. *∃ x (A(J, x) ∧ (C(x) ∨ H(x)))*
5. Using the clauses of the previous problem use **resolution** to try to prove by **refutation** that:

*L(J) → ¬ ∃ z (A(J, z) ∧ O(z))*

Number the query clauses, and each new clause produced by the resolution steps, beginning with the number following the last number of the previous problem.