First and last name _____ Student ID _____

AGENT-BASED ARTIFICIAL INTELLIGENCE
MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE (AI TEST)
Prof. Tommaso Di Noia
Academic Year 2023/2024 – 8th Exam
11/04/2025

Test duration: **2 hours**

(Prolog) Exercise 1
Vincenzo, Paolo, Danilo, and Giovanni have decided to organize a special **Sisinflab Pet Day** to bring their beloved animals together. However, not all pets get along; some have strong personalities and unique preferences. To ensure a peaceful and fun gathering, the pets must be divided into **three adjacent areas**, as illustrated below, while respecting the following constraints:

1. Diego doesn't get along with other males — he should only share space with females.
2. All Jack Russell dogs must stay in the same area.
3. Each area can host a maximum of two dogs. However, up to three animals are allowed if one or more of them are rabbits (since they are smaller).

Area 1	**Area 2**	**Area 3**

Write a **Prolog program** to help them assign each pet to one of the three areas, ensuring all constraints are satisfied.

Test your implementation using the following scenario:

- Jack, Melody, Zara, Diego, and Leo are dogs;
- Jack and Melody are Jack Russells;
- Cacco, Lil, and Camillo are rabbits;
- Jack, Diego, Leo, and Camillo are male;
- Melody, Zara, Cacco and Lil are female.

(Python) Exercise 2
Consider the problem described above. Model it as a **Constraint Satisfaction Problem (CSP) in Python** by defining the variables and their possible values.
In this exercise, take into account only the constraint related to the **capacity of each area**, assuming that each area can house up to **three pets**.