Fundamentals of Artificial Intelligence and Knowledge Representation
Mod. 2

academic years 2022/2023, 2023/2024, 2024/2025: Module 2 (Chesani)
previous academic years: Module 2 (ex-Gaspari) + Module 4 (Chesani)

Prof. Federico Chesani – 5th of February, 2025

Exam A – Available time: 1h.

1) The candidate is invited to define a predicate `mix/3` that takes in input two ordered lists `L1` and `L2` of integers (from the smaller to the bigger) and returns a new ordered list `L3` containing the elements of `L1` and `L2` (again, from the smaller to the bigger). The predicate must be defined without the cut operator.

    For example, if invoked with goal:
    ```
    % mix(L1, L2, Result)
    mix([1,3,5], [2,4,6], Result).
    ```
    The expected output is:
    ```
    Yes, Result = [1, 2, 3, 4, 5, 6]
    ```

    If invoked with goal:
    ```
    mix([], [2,4,6], Result).
    ```
    The expected output is:
    ```
    Yes, Result = [2, 4, 6]
    ```

    If invoked with goal:
    ```
    mix([1,3,5], [], Result).
    ```
    The expected output is:
    ```
    Yes, Result = [1, 3, 5]
    ```

2) The candidate is invited to define a simple Prolog meta-interpreter that will print on the standard output the message "Eureka!" every time a subgoal is proved directly (i.e., a subgoal is simply a fact). For example:
    ```
    p(a).
    p(b).
    q(a) :- p(a), p(b).

    ? - meta(q(a)).
    Yes
    Eureka!
    Eureka!
    ```

3) The candidate is invited to introduce the distribution semantics adopted in the LPAD, illustrating it with the use of a very simple example.

4) The candidate is invited to model the following situation using the Event Calculus approach.
    "A company produces a headlight for alpinists. There is only one button. Initially the headlight is off; when the button is pressed a first time, the light turns steady on; a further pressure of the button with the light steady on makes the light blinking; a further pression of the button switches the light off."