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 B – Available time: 1h.

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

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

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

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

2) The candidate is invited to define a simple Prolog meta-interpreter that will print on the standard output the message "Success!" every time a subgoal is proved directly (i.e., a subgoal is simply a fact). For example:
   ```
   p(1).
   p(2).
   q(3) :- p(1), p(2).

   ? - meta(q(3)).
   Yes
   Success!
   Success!
   ```

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 red taillight for bicycles. There is only one button. Initially the taillight is off; when the button is pressed a first time, the light turns blinking red; a further pressure of the button with the light flashing red makes the light steady on; a further pression of the button switches the light off."