

# 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."