

Fundamentals of Artificial Intelligence and Knowledge Representation

Mod. 2

academic years 2022/2023 – 2025/2026: Module 2 (Chesani)
previous academic years: Module 2 (ex-Gaspari) + Module 4 (Chesani)

13th of January 2026 – Available time: 1h.

Exam A

- 1) Define a predicate `filter/2` that receives as input a list of lists of terms named `TheBigList`. The predicate returns in output (by means of the second parameter) a new list of lists of terms. In particular, the predicate selects and returns those elements of `TheBigList` that are lists containing at least one integer. If a sublist of `TheBigList` is an empty list, then nothing will be inserted in the resulting list.

For example, the query:

```
% filter/2: filter(TheBigList, Result)
?- filter([ [1,2,aaa], [], [donald,duck], [a,b,c,4] ], Result).
```

The expected answer is:

```
Yes, Result = [ [1,2,aaa], [a,b,c,4] ]
```

To this end, the candidate will define (and use) a predicate `listWithOneInt/1` that is true if the parameter is a list containing at least one integer. To test if a term is an integer, it is possible to use the predefined predicate `integer(Term) : True if Term is bound to an integer`. Remember to define all the predicates used in the solution.

- 2) The candidate is invited to define a simple Prolog meta-interpreter that every time that a predicate `pred` is evaluated to true, then it prints the message "Success: pred" and then continues (as usual). For example, given the program:

```
p :- q, r.
p :- t.
q.
t.
```

The expected output is: `Solve(p)`

```
Success: q
Success: t
Success: p
true
```

The candidate is invited to represent, using LPADs, the following situation:

A student *X* will pass FAIKR exam with probability 0.85 if she physically attends the lessons. A student *X* will pass the FAIKR exam with probability 0.70 if she watches the recordings. A student that is abroad will watch the lessons with probability 0.9. Chiara is abroad.

The candidate must choose proper predicates and define the probabilistic rules. According to the Distribution Semantics, which is the probability that Chiara will pass the exam?

The candidate is invited to briefly introduce the Event Calculus approach, by citing and explaining the reserved predicates and the domain-independent axioms that characterize the EC approach.