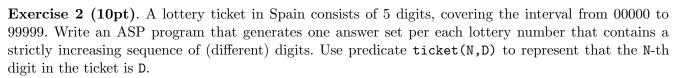
$\begin{array}{c} {\rm MASTER~IN~ARTIFICIAL~INTELLIGENCE~(UDC~-~USC~-~UVigo)} \\ {\bf REASONING~AND~PLANNING~exam.~June~17th,~2025} \end{array}$

Last Name:
First Name:
INSTRUCTIONS This exam covers units 1-6 and is weighted with a maximum of 42 points (pt) from a total of 100 pt in the whole course (Unit 7 is not covered in the exam and weights 8 pt). For the test, use the original statement sheet and avoid corrections or unclear marking (ask for a new blank sheet if needed). Completion time = 2 hours .
EXAM $$
Exercise 1 (20pt). Each question has at least one correct answer and its total score depends on whether you check: some incorrect answer = -3pt; all the correct answers = 5pt; only correct answers, but not all = 3pt; leaving blank = 0pt. A total negative score in Exercise 1 counts as 0pt in the rest of the exam.
1.1) Mark those formulas below that are equivalent to $p \to q \vee \neg r$ in classical propositional logic:
$\begin{array}{c} \bigcirc & p \wedge r \to q \\ \bigcirc & \neg p \vee \neg q \vee \neg r \\ \bigcirc & r \wedge \neg q \to \neg p \\ \bigcirc & p \to (r \to q) \end{array}$ 1.2) Given the positive logic program P with rules $\boxed{ p := q, r. }$ $\boxed{ r := p. }$ $\boxed{ q := q. }$ $\boxed{ s := p, r. }$ mark
the correct statements about the direct consequences operator T_P .
$egin{array}{ccc} T_P(\{\mathtt{p},\mathtt{q},\mathtt{r}\}) = \{\mathtt{p},\mathtt{q},\mathtt{r},\mathtt{s}\} \end{array} \qquad egin{array}{ccc} T_P(\emptyset) = \{\mathtt{q}\} \end{array}$
1.3) Given the following logic program a :- not b. b :- not c. c :- d, not a.
the reduct with respect to {a,b} is the program b. the reduct with respect to {d} is the program a. b. c. the reduct with respect to Ø is the program a. b. c:-d. the reduct with respect to {a,b,c} is the program the reduct with respect to {c} is the program a:- not b. c:-d, not a.
1.4) The rule $[a :- not b]$ corresponds to the formula $\neg b \to a$ in the logic of Here-and-There (HT). In classical logic, this formula is equivalent to $\neg a \to b$, but in HT they have different models. Mark those HT interpretations that are HT models of $\neg b \to a$ but not of $\neg a \to b$.
$ \Box H = \{b\}, T = \{b\} $ $ \Box H = \emptyset, T = \{b\} $ $ \Box H = \{a, b\}, T = \{a\} $ $ \Box H = \{a\}, T = \{a, b\} $



<pre>digit(19). position(15). #show ticket/2.</pre>			

Exercise 3 (8pt). A traffic light changes from green to red when a pedestrian pushes a button. The light returns from red to green when an internal clock sends the signal release. Model this system in telingo using the fluent light whose values can be red or green and the actions push (the button), release (when the clock sends the signal) and wait (that has no effect). Include the inertia law so that the light stays unchanged unless there is evidence on the contrary.

```
#program initial.
h(light,green).
action(release; push; wait).

#program dynamic.

#program initial. % Example of execution: push, wait 2 situations and release
&tel{ &true ;> o(push) ;> o(wait) ;> o(release) }.
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Exercise 5 (4pt). Write a formula in Description Logic (DL) that describes the set of actors (Actor) that have always acted (acted) in Spanish movies but have also acted in at least one terror movie (Terror).