

University of M'sila,
Faculty of Mathematics & Computer Science (CS),
Department of CS.

Course: AI Principles and Applications (AI Master 1st year)

Year: 2024-2025

Duration: 1:30

Final Exam

Q1. (5 points)

- What is AI according to the father of Artificial Intelligence John McCarthy? **(1 pt.)**

According to the father of Artificial Intelligence in 1956, John McCarthy, it is “The science and engineering of making intelligent machines, especially intelligent computer programs”.

- Give two applications of AI in our life? Explain them in details specifying:
You can extract the requested information from the presentations available on Moodle.

Application	AI Algorithm	Inputs	Outputs
(0.5 pt)	(0.5 pt)	(0.5 pt)	(0.5 pt)
(0.5 pt)	(0.5 pt)	(0.5 pt)	(0.5 pt)

- Based on the presentations presented by your colleagues, which one do you select to be the best presentation and why? **(Optional)**

Q2. (4 points)

The Missionaries and Cannibals problem illustrates the use of state space as follows:

Three missionaries and three cannibals wish to cross a river using a two person boat. If at any time the cannibals outnumber the missionaries on either side of the river, they will eat the missionaries. How can a sequence of boat trips be performed that will get everyone to the other side of the river without any missionaries being eaten?

- What does a state mean? **(1 pt.)**
- State is a collection of information that represents the current status of an AI system at a given moment. It involves the representation of variables, data, and conditions essential for decision-making,
- What are the states of the missionaries and cannibals problem?

BOAT position **(1 pt.)**

Number of Missionaries and Cannibals **(1 pt.)**

Start and Goal **(1 pt.)**

Q3. (5 points)

Which of the following sequences of characters in Prolog are atoms, which are variables, which are complex terms, and which are not terms at all? Give the functor and arity when possible.

- | | | |
|-----------------------------------|---------------------------------------|----------|
| 1. eats(child,chocolate) | complex term, functor: eats, arity: 2 | (1 pt.) |
| 2. 'Year' | atom | (0.5 pt) |
| 3. _Year | variable | (0.5 pt) |
| 4. Fly(birds) | not a term | (0.5 pt) |
| 5. fly(Birds) | complex term, functor: fly, arity: 1 | (1 pt.) |
| 6. and(big(burger),smoky(burger)) | complex term, functor: and, arity: 2 | (1 pt.) |
| 7. _and(big(X),smoky(X)) | not a term | (0.5 pt) |

Q4. (4 points)

Suppose we have the following database:

descend(X,Y) :- child(X,Y).

descend(X,Y) :- child(X,Z), descend(Z,Y).

child(martha,charlotte).

child(charlotte,caroline). // Caroline is a child of Charlotte

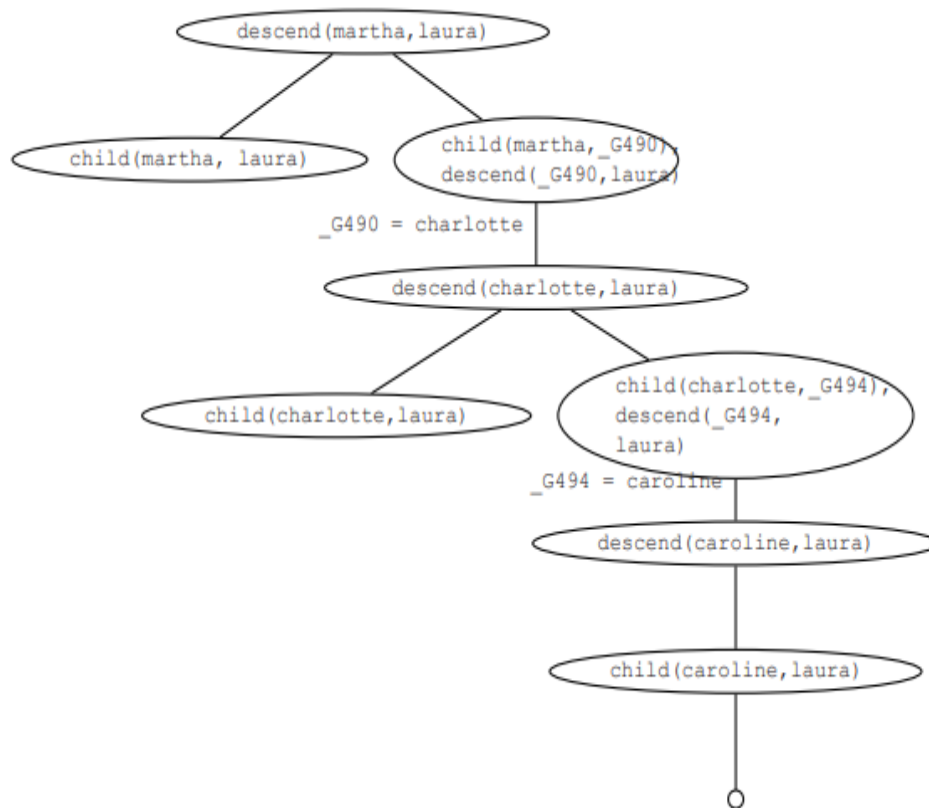
child(caroline,laura).

child(laura,rose).

The query is:

descend(martha,laura).

- Show through a search tree how Prolog performs the backtracking process for the given query? (0.5 pt for each node)



Q5. (2 points)

- What does optimality in search algorithms mean?
 - The ability of a search algorithm to return the optimal (best) solution (0.5 pt)
- Are these algorithms optimal: Depth First Search- Best First Search- Uninform Cost Search?

Depth First Search	not optimal	(0.5 pt)
Best First Search	not optimal	(0.5 pt)
Uninform Cost Search	optimal	(0.5 pt)