

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. (4 points)

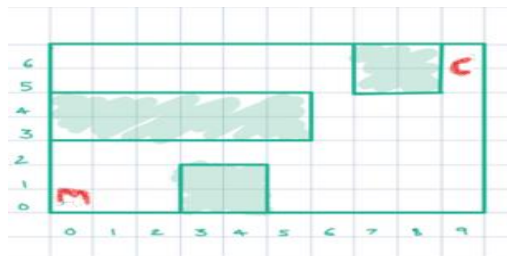
- What is KBS?.....(1 pt)

A knowledge-based system (KBS) is a type of computer system that analyzes knowledge, data and other information from sources to generate new knowledge.

- There are three types of human involvement in KBS. What are they and what's the role of each one?(3 pts)
 - **The end user**, who uses the system seeking for a solution to a particular problem. The second type of human involvement is in the knowledge acquisition process. This process requires the participation of a knowledge engineer and the expert.
 - **The knowledge engineer**, normally the system developer, is the person who seeks and then structures the knowledge from the experts of the particular area through interviews to find out how a particular problem is solved. The knowledge engineer is thus responsible for development of a KBS from the initial stage to the final delivery of the system including the maintenance of the system.
 - **The domain expert**, on the other hand, is a knowledgeable and skilled person who possesses special knowledge, experience, skills and judgement in solving problems in a specific domain.

Q2. (3.5 points)

In the maze below, c is a cat and m is a mouse, the goal of this game is that both the cat and the mouse move to find or avoid each other. They also can stand.



- Describe the states and the actions of this game?

States: mouse position and cat position (1 pt)

Actions: left, right, up, down, stand.....(0.5 pt for each)

Q3. (5 points)

How many facts, rules, clauses, and predicates are there in the following knowledge base? What are the heads of the rules, and what are the goals (bodies) they contain?

```
woman(vincent).  
woman(mia).  
man(jules).  
person(X) :- man(X); woman(X).  
likes(X,Y) :- knows(Y,X).  
father(Y,Z) :- man(Y), son(Z,Y).  
father(Y,Z) :- man(Y), daughter(Z,Y).
```

facts: 3 :(0.5 for each)
rules: 4
clauses: 7
predicates: 5 :
woman, man, person, likes, father :(1 pt)

Heads of the rules:(0.25 for each)
person(X) :-
likes(X,Y) :-
father(Y,Z) :-
father(Y,Z) :-

The goals:(0.25 for each)
:- man(X); woman(X).
:- knows(Y,X).
:- man(Y), son(Z,Y).
:- man(Y), daughter(Z,Y).

Q4. (3.5 points)

Suppose we have the following database:

```
wizard(ron).  
hasWand(harry).  
quidditchPlayer(harry).  
wizard(X) :- hasBroom(X),hasWand(X).  
hasBroom(X) :- quidditchPlayer(X).
```

How does Prolog respond to the following queries?

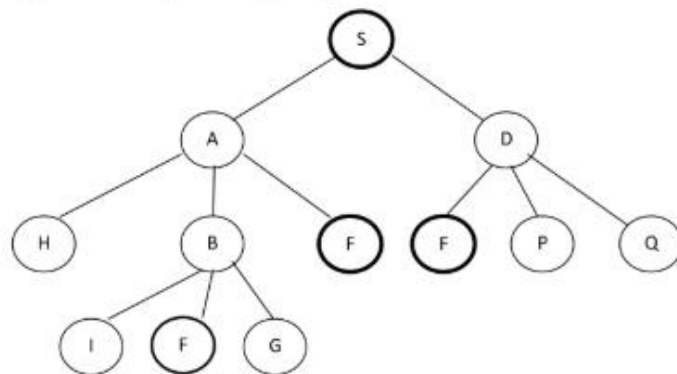
1. wizard(ron).
2. hasBroom (ron).
3. wizard(hermione).

4. hasWand (hermione).
5. wizard(harry).
6. wizard(Y).
7. witch(Y).

.....(0.5 for each)

1. wizard(ron). -> true
2. hasBroom (ron). -> false
3. wizard(hermione). -> false
4. hasWand (hermione). -> false
5. wizard(harry). -> true
6. wizard(Y). -> Y = ron ; Y = harry.
7. hasBroom(Y). -> Y = harry.

Q5. (4 points)



- Perform the Breadth First Search on the above tree where S is the start and F is the goal. Is this algorithm complete?
 - Yes, it is complete.....(1 pt)
 - The path is: S A D H B F + the tree.....(3 pts)