Makerere University
School of Computing & IT
Academic Year 2021/2022

CSC 1209: Logic Programming - Test 1 (BSc cs)
Date: 17th/07/2022, Time: 10:00 -11:00AM

Attempt all questions

1. How is logic programming different from imperative programming? [**2 marks**]
   Answer: logic programming is a declarative language where the use needs to specify what needs to be done without specifying how it will be done while C is procedure/imperative where we specify what to be done and how it should done.

2. Explain why you would prefer logic programming instead of C programming[**6 marks**]
   Answer: 1-Programming Ease. 2-agility -respond to different circumstance. 3-Versatility-multipurpose.

3. A logic programmer beginner has been trying to program some clauses in her/his knowledge base. On compiling the program some errors and warnings were observed. The programmer has decided to extract the clauses with errors and warning and has requested for your help to help her/him to figure out the problem. Below is the set of clauses, try to figure out type of problem and show the programmer how to solve it. [**6 marks**]

   (a) Rose(flower)
   Answer: error, operate is expend and the fact is not terminated. the correction rose(flower).

   (b) dean(X).
   Answer: Warning for the singleton X the correct version (dean(x)).

   (c) teacher(X): teaches(X,Y),lecture(X).
   Answer: error the rule misses a -

4. What are the two basic guiding principles in writing efficient recursive rules? [**4 marks**]
   Answer: The basic part of the rules is written first. 2 recursive sub goal in the appear in the right most side of the recursive part

5. University researchers sometimes play a game of tracing an academic back to a famous predecessor through their PhD supervisor. These are some facts that enumerate the PhD students of supervisors.

```
% super(supervisor, phd_student)
super(newton, lisa).
super(newton, stewie).
super(lisa, peter).
super(lisa, marge).
super(lisa, maggie).
super(stewie, lois).
super(stewie, peter).
super(lois, meg).
super(peter, brian).
super(marge, chris).
super(marge, bart).
```

Using these facts:

(a) Write a procedure `predecessor/2` that gives the names of a supervisor and his or her student. The output to a query such as ?- predecessor(newton, Student). should look as below. [**6 Marks**]

```
| ?- predecessor(newton, Student).
Student = lisa  ;
Student = stewie  ;
..............
```

Answer: predecessor(X,Y):- super(X,Y).
predecessor(X,Y):-super(X,Z),predecessor(Z,Y).

(b) Write a rule that gives the names of a student and supervisors where the student is jointly supervised by two supervisors. Note the two supervisors should be distinct.[**5 Marks**]
Answer: jointsuper(X,Y,Z):-super(X,Z),super(Y,Z), not(X=Y).

(c) Write a rule that gives the names of two students who share the same supervisor. Note the two students should be distinct. [**5 Marks**]
Answer: sharesuper(X,Y):- super(Z,X),super(Z,Y), not(X=Y).

(d) Write a rule that gives the names of two students who have different supervisors who themselves both had the same supervisor. [**6 Marks**]
Answer: students(X,Y):-super(Z,X),super(T,Y),super(P,T),super(P,Z), not(X=Y),not(Z=T).