CSAE 42: Artificial Intelligence

Instructor: Dr. Suraiya Jabin

Marks weightage: 5 (towards Theory Internal Assessment)

Note:

1. Collaborations on assignment works are not permitted.
2. Cheating and any other anti-intellectual behavior, including giving your work to someone else or downloading solution through Internet or copying your answers from your room mate or from back of the book, will be dealt with severity or may result in evaluation zero.
3. Assignments after the due date would not be accepted and will result in evaluation zero out of five.

Given on: Sunday, May 5, 2020

Due on: Tuesday, May 9, 2020 (Before 2 PM)

Topics: Prolog (cut, fail, recursive rules, list, DCG, clpfd etc.)

1. Define the relation
max(X, Y, Max)
so that Max is the greater of two numbers X and y.

2. Define the predicate
maxlist(List, Max)
so that Max is the greatest number in the list of numbers List.

3 Define the predicate
sumlist(List, Sum)
so that Sum is the sum of a given list of numbers List.

4. The following relation classifies numbers in to three classes positive, zero, and negative:
class(Number, positive) :- Number > 0.
class(0, zero).
class(Number, negative) :- Number < 0.

Define this procedure in a more efficient way using cuts.

5. Define the procedure
split(Numbers, Positives, Negatives)
which splits a list of numbers into two lists: positive ones (including zero)
and negative ones. For example,
split([3,-1,0,5,-2][,3 ,0,5],[-1,-21)
Propose two versions: one with a cut and one without.

6. Consider this prolog program and answer the query for a cut-free program and this program with cut. Give your answer by drawing proof tree.

```
p(X):- a(X).
p(X):- b(X),c(X),!,d(X),e(X).
p(X):- f(X).
a(1). b(1).   b(2).c(1).c(2). d(2). e(2).f(3)

?- p(X).
```

7. Please refer slide no 45 in lecture slide dated 5/5/2020 (3 DCG and CLPFD.pptx) to answer these questions:
i. whether this same is sufficient to answer queries for both way translation? If not, modify this program to do it.
ii. explain the purpose of phrase predicate in this program.
iii. explain the purpose of cut operator in this program.

8. Write a cryptarithmetic puzzle solver using clpfd for this puzzle:
HAIKU+SUSHI=KIMONO