Lincoln School of Computer Science

Assessment Component Briefing Document

Title: CMP2020M Artificial Intelligence – Component Two	**Indicative Weighting: 25%**

Learning Outcomes:

On successful completion of this component a student will have demonstrated competence in the following areas:

- [LO1] explain the theoretical capabilities of Artificial Intelligence;
- [LO2] apply Artificial Intelligence techniques to solve practical problems;
- [LO3] locate and reference relevant information.

Requirements

This is the second of two assessed Workshop Tasks, which will then be assessed in following week following the hand-in date. You have two answer the following questions and write Prolog code were asked for. All Prolog code has to be submitted as one zip file. The reference implementation for your code is SWI-Prolog. Your code has to work in this Prolog implementation. So, you are expected to submit two documents for this assessment:

1. The zip file containing all your **own Prolog code** with appropriate **documentation**. Please indicate in your source code comments which question your code is an answer for.
2. An **individual report explaining your source code and answering the questions**. You may quote (parts of) your code in this document. Explain in your own works why and how your solution works. Please refer to source files where appropriate. Reference any sources you have used in your report following Harvard citation standards. Your report must not be longer than **three pages**.

The actual task (questions 1 to 3) can be found at the end of this document!

Useful Information

This assessment is an individually assessed component. Your work must be presented according to the Lincoln School of Computer Science guidelines for the presentation of assessed written work. Please make sure you have a clear understanding of the grading principles for this component as detailed in the accompanying Criterion Reference Grid.
If you are unsure about any aspect of this assessment component, please seek the advice of a member of the delivery team.

Submission Instructions

The deadline for submission of **individual reports** and **program code** is spread throughout the semester. Please check the official documentation for hand-in dates. Every student is required to demonstrate his or her solution to the delivery team at the beginning of the following workshop and explain the working of the submitted solution.

You must make an electronic submission of your work in PDF format together with a zip file containing all developed code files by using the assessment link on Blackboard for this component. *DO NOT include this briefing document with your submission.*

Task

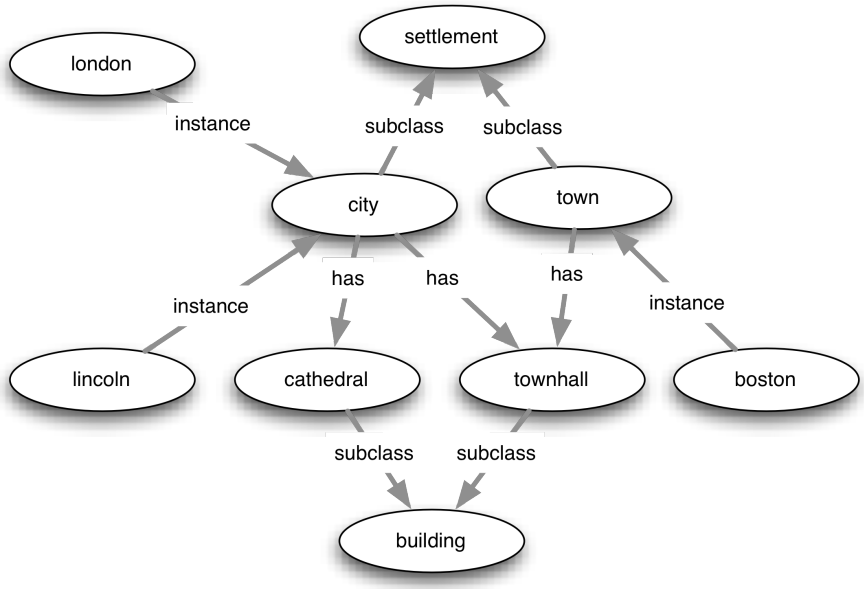
Q1. Write a recursive predicate maximum(L, X) that takes as input L a list of numbers and returns as output X the maximum of these numbers. E.g. L=[1,2,5,4], then should be X=5.

[20 marks]

Q2. Write a recursive predicate duplicate_nth(N, L1, L2) that takes as input a list L1 and an integer N and returns a list L2 which is equivalent to the first list L1 with the Nth element duplicated. For example, the query duplicate_nth(3, [a, b, c, d, e, f], X) should return the answer X = [a, b, c, c, d, e, f].

[20 marks]

Q3. Implement the concept of inheritance in semantic networks in Prolog so you can infer knowledge automatically. The following semantic network is given:



a. Implement all “instance” links between a class c (e.g. “city”) and an individual m (e.g. “lincoln”).
   Hint: Refer to the lecture slides for a similar problem. [6 marks]
b. Implement all “subclass” links between a class c and a superclass s.
   [9 marks]
c. Implement all the “has” properties so that inheritance is correctly realised (this means that your implementation can infer, e.g, that Boston has a town hall and that Lincoln has (at least one) buildings. [20 marks]
d. Use your Prolog implementation to query everything that Lincoln has; include the query and the Prolog output/trace. [10 marks]
e. Add another predicate to your Prolog code to represent the specific cathedral (stmarys) in Lincoln. Verify by running the query from question d. (query all buildings in Lincoln) again and explain the difference.
   [15 marks]