CA208 Logic

Prolog Lab Exam
6th March 2024

To login, you must use the following Windows account on the lab desktops.

username: ca208 (no "dcu\" before the username)
Password: floor7paper9

All internet traffic is blocked except for '**lockbox.computing.dcu.ie**'.

All applications are available on Windows. A shortcut to Prolog appears on the desktop, along with a shortcut to the Lockbox website. Also a shortcut to the local user "Documents" folder appears on the desktop. You can save your file here or on the desktop during the exam before uploading them to Lockbox.

Store all your answers in **one** file whose name is your student ID number followed by ".pl". For example, if 12345678 is your student ID then your file should be 12345678.pl. Start each answer with a comment that identified the question being answered. Comments start with a '%' symbol and finish at the end of the line.

You must **submit** your answer file **using Lockbox** (lockbox.computing.dcu.ie) using the key **ca208-lab-exam**. Files stored on the desktops will not be accessible after the exam!!! You will need your standard DCU login credentials to *access Lockbox.*

Preamble: **(Please read carefully!)**

The following set of facts describes the roads between pairs of towns. The relation *road(A,B,N)* is true if a one-way road of length *N* km exists from *A* to *B*.

An example set of facts is:

```
road(northbog, westhome, 3).
road(oldtown, westhome, 4).
road(oldtown, poshville, 5).
road(villanua, oldtown, 2).
road(eastwick, poshville, 2).
road(poshville, northbog, 3).
road(westpark, villanua, 2).
road(westpark, southfork, 7).
road(southfork, eastwick, 2).
```

Q1. [6 marks]

Using the facts outlined in the Preamble, write the following relations:

- *between(X,Y,Z)* which is true if there is a road from *X* to *Y* and from *Y* to *Z*.
- *closeTo(X,Y)* which is true if the road from *X* to *Y* is less than or equal to 3 km .

Q2. [9 marks]

Using the facts outlined in the Preamble, write the relation *route(A,B)* which is true if there exists a route, with zero or more intermediate towns, between *A* and *B*.

Q3. [10 marks]

Write the following relations for lists of numbers:

- *sum(X, L)* which is true if X is the sum of the values in the list L.
- *maximum(X, L)* which is true if X is the largest value in the list L.