Assignment 5 of CS2209A

Completion of the assignment must be an individual effort.
Due date: 2021.12.3 (by 11:55 pm)
This assignment is worth 10% towards your final mark.

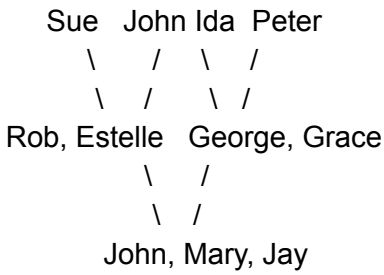
This is a written assignment. Note that these questions would be similar to questions in the final exam.

5%: From this PDF file, translate the following to WFFs, and then prove or refute using S/I rules (strictly), and resolution (so two methods for each question)
Exercise 6.4b
Q6
Q9
Q11 (the very famous logical paradox)
Q16
Q21

How to Submit:
Submit your writing in one PDF file via OWL. You could use handwriting and/or drawing in the file but make sure they can be viewed clearly otherwise marks can be deducted.

5% Prolog questions

Q1.



Based on the family tree above, add basic facts about the family members above. Then write rules about grandfather, grandparent, ancestor (that works for a large family tree), uncle, mother_in_law, brother, and two_brother. Issue various queries to verify you get the correct answer(s).

Q2. As we discussed in the lecture, Watson failed in answering this question in the Jeopardy!

Write a Prolog program so when the question is asked, the correct answer will be returned. You need to include facts about several US and Canadian cities (must include Chicago and Toronto), airport names, WWII hero names, and so on. Load your code in Prolog, issue the query, and your Prolog program should return the correct answer. To make the Prolog programming easier, you could modify the clue to be "One of its airports is named for a World War II hero; the other airport, for a World War II battle".

Q3. This question concerns lists in Prolog. (Note: Prolog probably has built-in last, append, etc. so you can use my_last, my_append, instead)
Define the following relations:
a. last(X,Xs) is true if X is the last element in the list Xs. For example, last(c, [a, b, c]) would be true; or if you query last(X, [a, b, c]), it would return X=c.
b. adjacent(X,Y,Zs) is true if the elements X and Y are adjacent in the list Zs. For example, adjacent(d, f, [a, b, c, d, f, g]) is true.
c. palindrome(X) if X is a list that reads the same in both directions, such as [1, 2, 5, 2, 1].

Q4. Write a Prolog program for calculating the Fibonacci numbers. The first two Fibonacci numbers are 0 and 1 respectively: such as fib(1, 0), fib(2, 1). The n'th Fibonacci number is the sum of the previous two Fibonacci numbers.

Q5. Give a list of numbers, write the predict for sum(List, Sum), mean(List, Mean), min(List, Min), and max(List, Max).

How to Submit:
Put all of your Prolog codes in one file (such as student_ID.pl), and attach it via OWL. Also save a few screenshots for each question and put them in one PDF file, and submit it via OWL.