COMP219: Artificial Intelligence
Lab Exercise 3 - To be carried out in Week 4

1. Create a new Prolog programme file in your Prolog programmes directory and call it *lab3.pl*. Add to it the definition of `tmember` given in Lecture 9 (the lecture on lists in Prolog). Use `tmember` to find whether:
   (a) 3 is a member of the list [1,2,3,4,5]
   (b) 7 is a member of the list [1,2,3,4,5]
   (c) a is a member of the list [l,a,b,o,r,a,t,o,r,y]
   (d) z is a member of the list [l,a,b,o,r,a,t,o,r,y]
2. Try tracing each of the above examples. (See last week's exercise for details on how to perform a trace).
3. From the notes for Lecture 9, add the definition of `tappend` to your programme and reload. Note what results you get for the following queries:
   (a) `tappend([3,4,5],[1,2],X).`
   (b) `tappend([1,2],[3,4,5],X).`
   (c) `tappend([3,4,5],[],X).`
   (d) `tappend([],[3,4,5],X).`

   Trace your solutions as before.
4. Write a rule `sumList(X,Y)` which, when a list of numbers `X` is input, `Y` will contain the sum of that list. Use `sumList(X,Y)` in queries to verify that it works as expected.
5. Write a rule `deleteOne(X,Y,Z)`, such that `Z` is the result from deleting the first occurrence of `Y` in the list `X`. If `X` does not contain `Y` then just return `X`. Use `deleteOne(X,Y,Z)` in queries to verify that it works as expected.
6. Write a rule `deleteAll(X,Y,Z)`, such that `Z` is the result from deleting all occurrences of `Y` in the list `X`. Use `deleteAll(X,Y,Z)` in queries to verify that it works as expected.
7. Write a rule `reverseList(X,Y)`, such that given list `X`, `Y` is the result of reversing `X`. Use `reverseList(X,Y)` in queries to verify that it works as expected.
8. Write a rule `oddEven(X,Y)`, such that `Y` is set to "odd" if the number of elements in the list `X` is odd and `Y` is set to "even" if the number of elements in the list `X` is even. Hint: you need two sets of rules (oddEven and oddEven1) each calling the other alternately. Use `oddEven(X,Y)` in queries to verify that it works as expected.