Tutorial 3: Prolog

THESE SLIDES ARE INSPIRED BY DR TALEB'S TUTORIAL

Exercise 1

- Given the following prolog code,

```
arr0(X,Y,[X|Y]).
arr1(X,[_|X]).
arr2([_,_]).
arr3(X,Y,Z,[[X,Y]|Z]).
arr4(X,Y,Z,[[X|Y],Z]).
arr5(X,Y,Z,[[X|Y]|Z]).
arr6(X,[X|_],[_|X]).
arr7([_|_]).
```

Exercise 1

- Find the output of the following queries :

Query	Output	Query	Output	Query	Output
arr0(H,T,[])		arr2([a,a])		arr5(H,Y,T,[[a,b],[d,g]])	
arr7([])		arr2([a,a,a])		arr6(X,[a],[a])	
arr0(X,Y,[[a,b],c])		arr3(H,Y,T,[[a,b]])		arr0(X,Y,[a,[b]])	
arr0(X,Y,[[a,b]])		arr3(H,Y,T,[a,b,c])		arr1(X,[a])	
arr1(X,[])		arr4(H,Y,T,[[a,b],d,g])		arr5(H,Y,T,[[a,b],d,g])	

Exercise 2

- Write down a Prolog procedure third-to-last to find the third-to-last element from a list.

Exercise 3

- Define append_list(L1, L2, Newlist) to mean "Append a list L1 with list L2 to the new list NewList".
- Example: append_list([a, b], [c, d, e,], NewList). Answer => NewList = [a, b, c, d, e].

Exercise 4

- Define reverse(L, R) to mean “the reverse of list L is R”.
- Example: reverse([a, b, c]). Answer is : R = [c, b, a].

Exercise 5

- Define nth_element(N, X, L) to mean “X is a nth element in the list L at the position N”.
- Examples:
  - nth_element(4, X, [a, b, c, d, e]). Answer is : X = e.
  - nth_element(0, X, [a, b, c, d, e]). Answer is : X = a.

Exercise 6

- Define insert_nth(E, M, L, NL) to mean “insert an element E into Mth position of list L to generate a new list NL”.
- Example: insert_nth(b, 1, [a, c],N). Answer is : N = [a, b, c].

Exercise 7

- Write down a Prolog program that takes two lists as arguments, and succeeds if the first list is twice the size of the second list.
- Example:
  - a2b([a,a,a,a],[b,b,b]). Answer is No
  - a2b([a,a,a,a],[b,b]). Answer is Yes

Exercise 8

- Write a Prolog program to create a list containing all integers within a given range as follows: range(I, K, L) :- I <= K, and L is the list containing all consecutive integers from I to K
- Example : - range (1,4,X) => X=[1,2,3,4]