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MODULE: AI

TP3

Task1:

I. To check if an item is in a list

```
| ?- is_list(3, [1, 2, 3, 4, 5]).  
true ? ;
```

II. Calculate the length of a list

```
(15 ms) no  
| ?- list_length([1, 2, 3, 4, 5], Length).  
Length = 5
```

III. Concatenate two lists

```
| ?- concat_lists([1, 2, 3], [4, 5, 6], Result).  
Result = [1,2,3,4,5,6]
```

IV. Delete an item from a List

```
| ?- delete_item(3, [1, 2, 3, 4, 5], Result).  
Result = [1,2,4,5] ? ;
```

V. Append an item to a List

```
| ?- append_item(6, [1, 2, 3, 4, 5], Result).  
Result = [1,2,3,4,5,6]
```

VI. Insert an item in a List

```
| ?- insert_item(3, [1, 2, 4, 5], Result).  
Result = [3,1,2,4,5] ? ;  
Result = [1,3,2,4,5] ? ;  
Result = [1,2,3,4,5] ? ;
```

Task2:

Write a program in Prolog to find the maximum value in a list of integer numbers.

Code:

```
1 /* Create an empty array */  
2 max_list([X], X).  
3  
4 /* Compare the first element with the maximum of the rest of the list */  
5 max_list([X|Rest], Max) :-  
6   max_list(Rest, MaxRest),  
7   X >= MaxRest,  
8   Max is X.  
9  
10 /* The maximum is in the rest of the list */  
11 max_list([X|Rest], Max) :-  
12   max_list(Rest, MaxRest),  
13   X < MaxRest,  
14   Max is MaxRest.  
15
```

Execution:

```
| ?- max_list([100, 1, 50, 85, 124], Max).
```

```
Max = 124
```

Task3:

Assume given a set of facts of the form `father(name1,name2)` (name1 is the father of name2).

- I. Define a predicate `brother(X,Y)` which holds iff X and Y are brothers.
- II. Define a predicate `cousin(X,Y)` which holds iff X and Y are cousins.
- III. Define a predicate `grandson(X,Y)` which holds iff X is a grandson of Y.
- IV. Define a predicate `descendent(X,Y)` which holds iff X is a descendent of Y.

```
1 % Given facts
2 father(paul, jack).
3 father(paul, joe).
4 father(joe, lana).
5 father(jack, lina).
6 % Rule to determine if X and Y are brothers
7 brother(X, Y) :-
8     father(F, X),
9     father(F, Y),
10    X \= Y.
11
12 % Rule to determine if X and Y are cousins
13 cousin(X, Y) :-
14     father(F1, X),
15     father(F2, Y),
16     brother(F1, F2),
17     X \= Y.
18
19 % Rule to determine if X is a grandson of Y
20 grandson(X, Y) :-
21     father(Y, F),
22     father(F, X).
23
24 % Rule to determine if X is a descendant of Y
25 descendent(X, Y) :-
26     father(Y, X).
27 descendent(X, Y) :-
28     father(Y, Z),
29     descendent(X, Z).|
```

```
| ?- brother(jack, joe).
```

```
true ? :
```

```
Action (; for next solution, a for all solutions, RET to stop) ?
```

```
no
```

```
| ?- brother(jack, joe).
```

```
true ? ;
```

```
no
```

```
| ?- cousin(lana, lina).
```

```
true ? ;
```

```
no
```

```
| ?- cousin(lana, paul).
```

```
no
```

```
| ?- descendent(lina, paul).
```

```
true ? ;
```

```
no
```

```
| ?-
```
