Assingment 3 - Programming Paragidms

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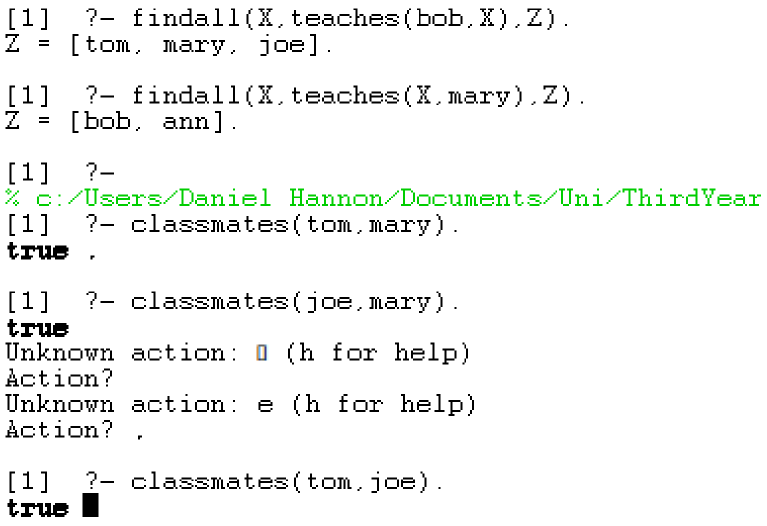
1 Question 1

```
takes(tom,ct331).
takes(mary, ct331).
takes(joe, ct331).
takes(tom, ct345).
takes(mary, ct345).
instructs(bob, ct331).
instructs(ann, ct345).

teaches(Y,X) :-
  instructs(Y,Z),
  takes(X,Z).

classmates(X,Y) :-
  takes(X,Z),
  takes(Y,Z).
```

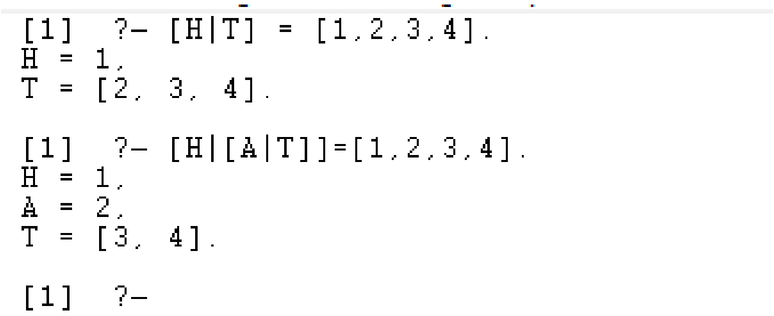


```
[1]  ?- findall(X,teaches(bob,X),Z).
Z = [tom, mary, joe].

[1]  ?- findall(X,teaches(X,mary),Z).
Z = [bob, ann].

[1]  ?-
% c:/Users/Daniel Hannon/Documents/Uni/ThirdYear
[1]  ?- classmates(tom,mary).
true .

[1]  ?- classmates(joe,mary).
true
Unknown action: ▯ (h for help)
Action?
Unknown action: e (h for help)
Action? .

[1]  ?- classmates(tom,joe).
true █
```

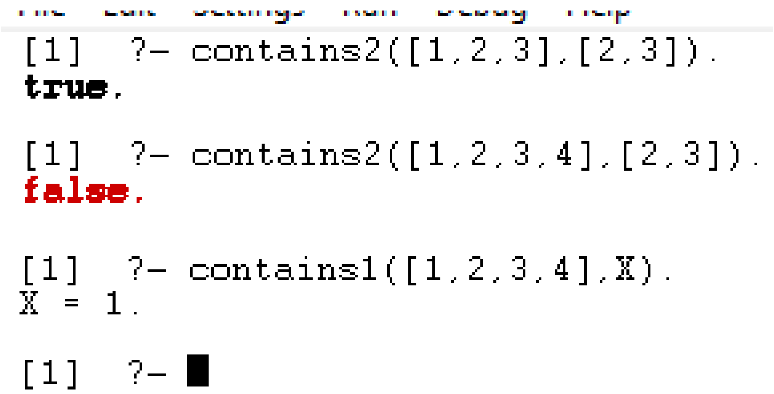
1.4 returns false as they are both students so neither instructs and as a result ann definitely does not teach joe.

2 Question 2

```
contains1(X,Y) :-
  [H|_] = X,
  Y = H.

contains2([_|X],Y) :-
  X = Y.
```



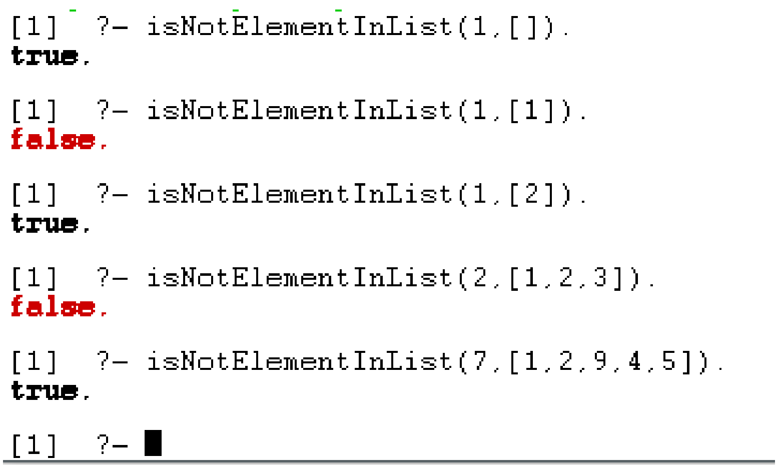
```
[1]  ?- [H|T] = [1,2,3,4].
H = 1,
T = [2, 3, 4].

[1]  ?- [H|[A|T]]=[1,2,3,4].
H = 1,
A = 2,
T = [3, 4].

[1]  ?-
```



```
[1]  ?- contains2([1,2,3],[2,3]).
true.

[1]  ?- contains2([1,2,3,4],[2,3]).
false.

[1]  ?- contains1([1,2,3,4],X).
X = 1.

[1]  ?- █
```

3 Question 3

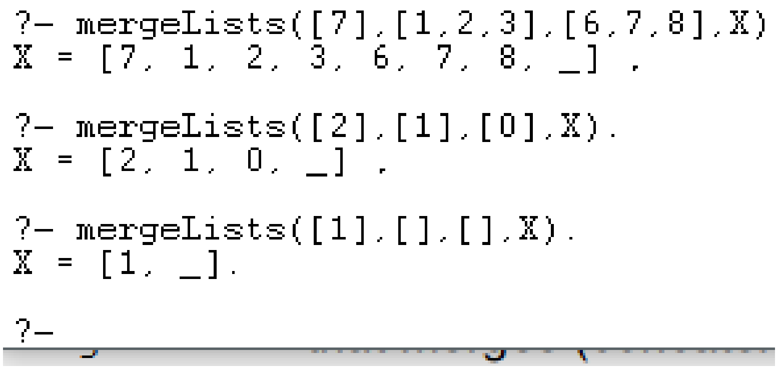
```
isNotElementInList(E,List) :-
  ((List = []) ->
    1=1
    ;
    [H|T] = List,
    E =\= H,
    isNotElementInList(E,T)).
```



```
[1]  ?- isNotElementInList(1,[]).
true.

[1]  ?- isNotElementInList(1,[1]).
false.

[1]  ?- isNotElementInList(1,[2]).
true.

[1]  ?- isNotElementInList(2,[1,2,3]).
false.

[1]  ?- isNotElementInList(7,[1,2,9,4,5]).
true.

[1]  ?- 
```

4 Question 4

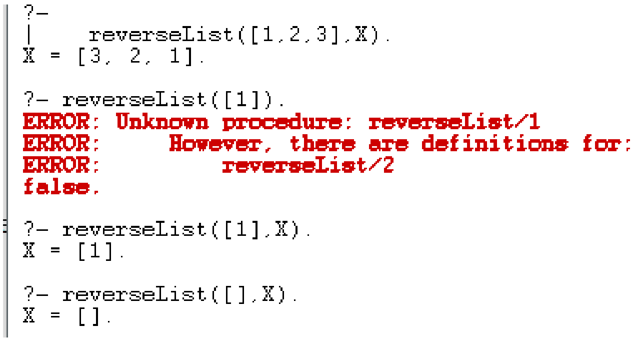
```
mergeLists([H|T],List2,List3,[H|Output]) :-
  mergeLists(T,List2,List3,Output).
mergeLists([],[H|T],List3,[H|Output]) :-
  mergeLists([],T,List3,Output).
mergeLists([],[],[H|T],[H|Output]) :-
  mergeLists([],[],T,Output).
  %I Don't know how to get rid of '_' from the end of the list, I've tried several things
  %but nothing worked
mergeLists([],[],[],[Output]).
```



```
?- mergeLists([7],[1,2,3],[6,7,8],X)
X = [7, 1, 2, 3, 6, 7, 8, _] .

?- mergeLists([2],[1],[0],X).
X = [2, 1, 0, _] .

?- mergeLists([1],[],[],X).
X = [1, _].

?-
```

5 Question 5

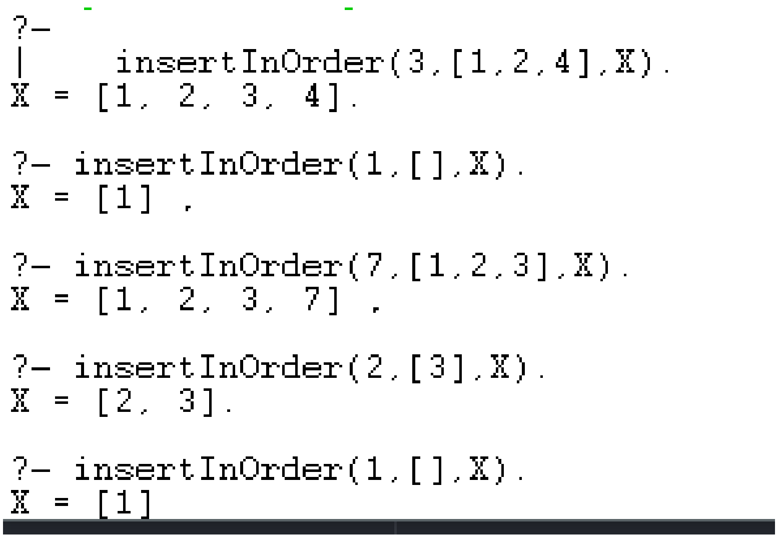
```
reverseList([],[]).
reverseList([H|T],Y) :-
  reverseList(T,A),
  cons(A,[H],Y).

cons([],L,L).
cons([H|T],L2,[H|Y]):-
  cons(T,L2,Y).
```



```
?-
|    reverseList([1,2,3],X).
X = [3, 2, 1].

?- reverseList([1]).
ERROR: Unknown procedure: reverseList/1
ERROR:     However, there are definitions for:
ERROR:         reverseList/2
false.

?- reverseList([1],X).
X = [1].

?- reverseList([],X).
X = [].
```

6 Question 6

```
insertInOrder(A,[],C):-
  cons([],[A],C).
insertInOrder(A,B,C):-
  [H|T] = B,
  (A < H->cons([A],B,C);insertInOrder(A,T,D),cons([H],D,C)).

cons([],L,L).
cons([H|T],L2,[H|Y]):-
  cons(T,L2,Y).
```



```
?-
|    insertInOrder(3,[1,2,4],X).
X = [1, 2, 3, 4].

?- insertInOrder(1,[],X).
X = [1] .

?- insertInOrder(7,[1,2,3],X).
X = [1, 2, 3, 7] .

?- insertInOrder(2,[3],X).
X = [2, 3].

?- insertInOrder(1,[],X).
X = [1]
```