

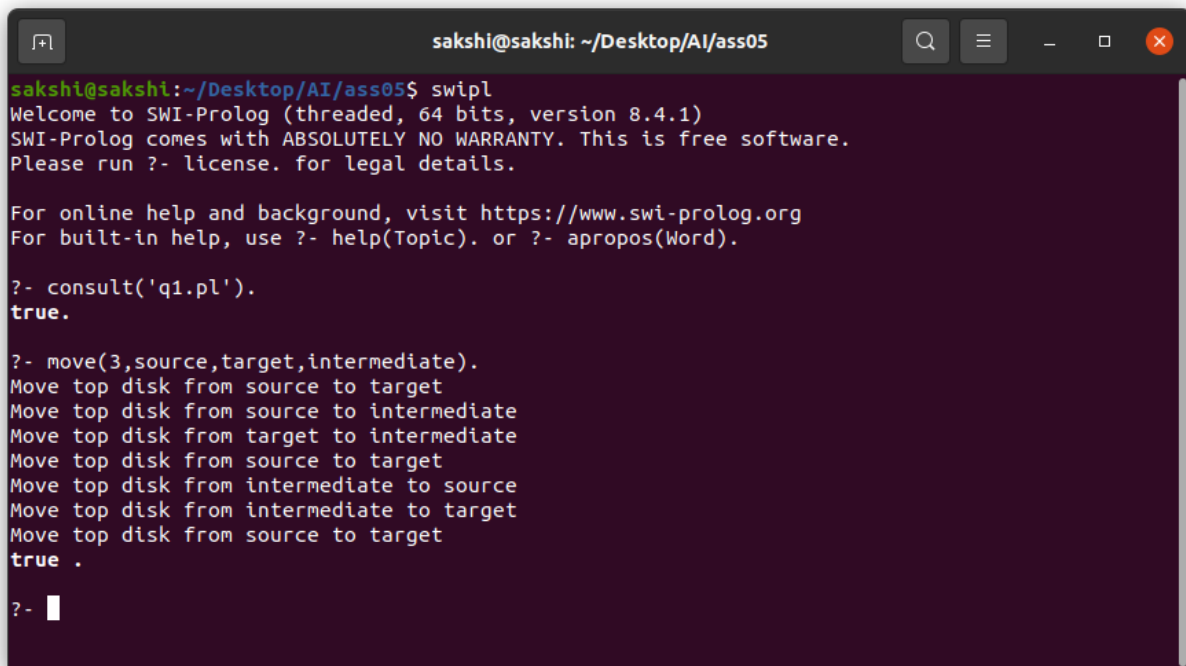
AI ASSIGNMENT – 5

1. Perform Towers of Hanoi.

Source Code:

```
% tower of hanoi
move(1,X,Y,_):-
    write('Move top disk from '),
    write(X),
    write(' to '),
    write(Y),
    nl.

move(N,X,Y,Z):-
    N>1,
    M is N-1,
    move(M,X,Z,Y),
    move(1,X,Y,_),
    move(M,Z,Y,X).
```



The screenshot shows a terminal window titled 'sakshi@sakshi: ~/Desktop/AI/ass05'. The user has entered the command 'swipl' to start SWI-Prolog. The program's welcome message is displayed, followed by the command '?- consult('q1.pl').'. The program then executes the 'move' predicate for N=3, source=source, target=target, and intermediate=intermediate. The output shows the sequence of moves: 'Move top disk from source to target', 'Move top disk from source to intermediate', 'Move top disk from target to intermediate', 'Move top disk from source to target', 'Move top disk from intermediate to source', 'Move top disk from intermediate to target', and 'Move top disk from source to target'. The program returns 'true' and the prompt '?- ' is shown.

```
sakshi@sakshi: ~/Desktop/AI/ass05$ swipl
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.1)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- consult('q1.pl').
true.

?- move(3,source,target,intermediate).
Move top disk from source to target
Move top disk from source to intermediate
Move top disk from target to intermediate
Move top disk from source to target
Move top disk from intermediate to source
Move top disk from intermediate to target
Move top disk from source to target
true .

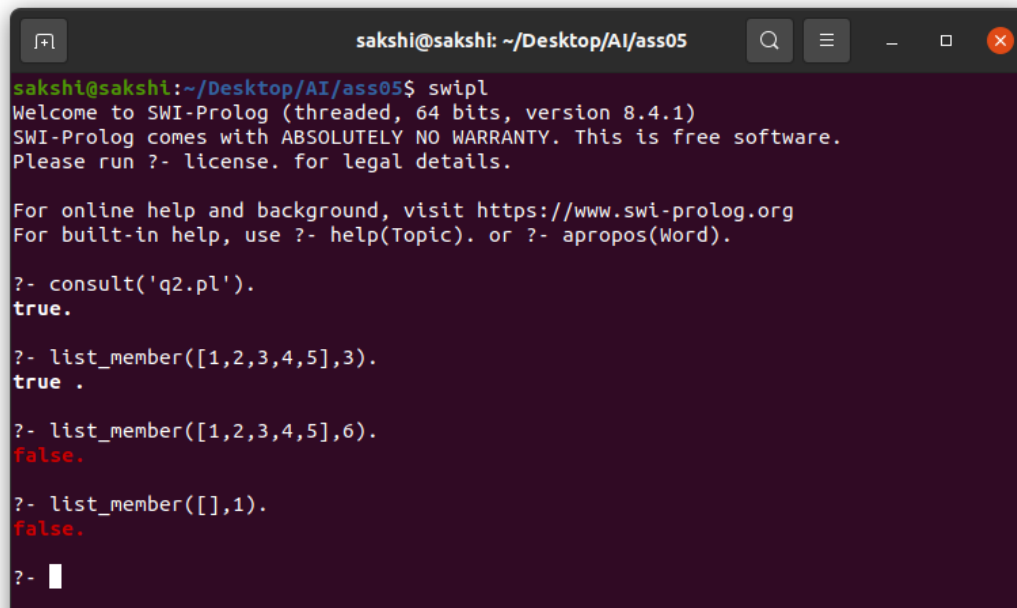
?- 
```

2. WAP to check whether the number is present in the list or not.

Source Code:

```
% number is present in the list or not
```

```
list_member([X|_],X).
list_member([_|Tail],X) :- list_member(Tail,X).
```



A terminal window titled 'sakshi@sakshi: ~/Desktop/AI/ass05' showing the execution of Prolog code. The user runs 'swipl', which displays a welcome message for SWI-Prolog (version 8.4.1). The user then enters several queries: 'consult('q2.pl')' returns 'true.'; 'list_member([1,2,3,4,5],3)' returns 'true.'; 'list_member([1,2,3,4,5],6)' returns 'false.'; and 'list_member([],1)' returns 'false.'.

```
sakshi@sakshi:~/Desktop/AI/ass05$ swipl
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For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- consult('q2.pl').
true.

?- list_member([1,2,3,4,5],3).
true.

?- list_member([1,2,3,4,5],6).
false.

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

?-
```

3. WAP to add a number in the list.

Source Code:

```
% add a number in the list
add_element(X,[],[X]).
add_element(X,[Y|T1],[Y|T2]) :- add_element(X,T1,T2).
```



A terminal window titled 'sakshi@sakshi: ~/Desktop/AI/ass05' showing the execution of Prolog code. The user runs 'swipl', which displays a welcome message for SWI-Prolog (version 8.4.1). The user then enters several queries: 'consult('q3.pl')' returns 'true.'; 'add_element(3,[1,4,5],L)' returns 'L = [1, 4, 5, 3].'; and 'add_element(c,[],L)' returns 'L = [c].'

```
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For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- consult('q3.pl').
true.

?- add_element(3,[1,4,5],L).
L = [1, 4, 5, 3].

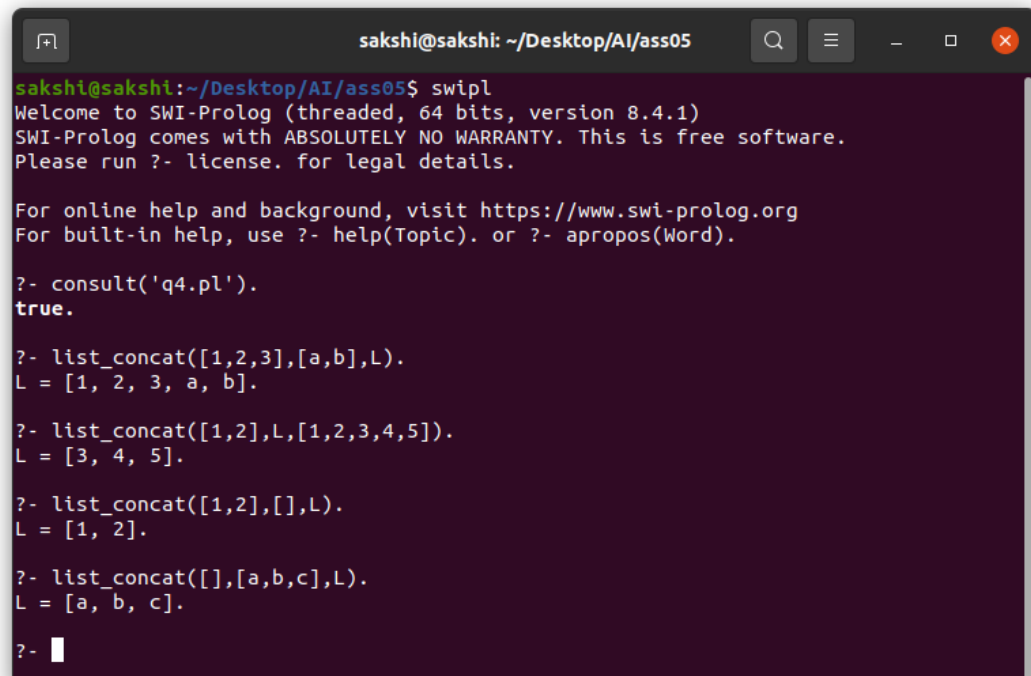
?- add_element(c,[],L).
L = [c].

?-
```

4. WAP to concat two lists and store the result in third list.

Source Code:

```
% concat two lists
list_concat([],L,L).
list_concat([X1|L1],L2,[X1|L3]) :- list_concat(L1,L2,L3).
```

A screenshot of a terminal window titled 'sakshi@sakshi: ~/Desktop/AI/ass05'. The terminal shows the execution of SWI-Prolog. The user enters 'swipl' at the prompt. The terminal displays the Prolog welcome message and version information (8.4.1). The user then enters several Prolog queries to test the 'list_concat' predicate. The first query is 'consult('q4.pl').', which returns 'true.'. The second query is 'list_concat([1,2,3],[a,b],L).', which returns 'L = [1, 2, 3, a, b].'. The third query is 'list_concat([1,2],L,[1,2,3,4,5]).', which returns 'L = [3, 4, 5].'. The fourth query is 'list_concat([1,2],[],L).', which returns 'L = [1, 2].'. The fifth query is 'list_concat([], [a,b,c], L).', which returns 'L = [a, b, c].'. The terminal ends with a prompt '?' and a cursor.

5. WAP to delete an element from the list.

Source Code:

```
% delete an element from the list
delete_ele(X,[X],[]).
delete_ele(X,[X|Tail],Tail).
delete_ele(X,[H|Tail],[H|Tail1]) :- delete_ele(X,Tail,Tail1).
```

```
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?- consult('q5.pl').
true.

?- delete_ele(3,[1,2,3,4],L).
L = [1, 2, 4] .

?- delete_ele(5,[1,2,3,4],L).
false.

?- delete_ele(5,[5],L).
L = [] .

?- delete_ele(5,[],L).
false.

?- 
```

6. WAP to sum the elements of a list of numbers

Source Code:

```
% sum the elements of a list of numbers
total_sum([],0).
total_sum([H|Tail],Sum) :-
    total_sum(Tail,Rest),
    Sum is Rest+H.
```

```
sakshi@sakshi: ~/Desktop/AI/ass05
sakshi@sakshi:~/Desktop/AI/ass05$ swipl
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?- consult('q6.pl').
true.

?- total_sum([1,2,3,4,5],X).
X = 15.

?- total_sum([9],X).
X = 9.

?- total_sum([],X).
X = 0.

?- 
```

