

ASSIGNMENT: 4 :AI

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ADMISSION NO:U19CS082

Q1. W.A.P.P to find factorial of a number.

```
factorial(0,1).
    factorial(X,Y):-
        X>0,
        X1 is X-1,
        factorial(X1,Y1),
        Y is X*Y1,!.
```



GNU Prolog console

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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q1.pl compiled, 5 lines read - 958 bytes written, 17 ms
| ?- factorial(5,X).

X = 120

yes
| ?- |

Q2. W.A.P.P to print Fibonacci series.

```
fib(0,0).
fib(1,1).

fib(X,Y):-
    X>1,
    X1 is X-1,
    X2 is X-2,
    fib(X1,Y1),
    fib(X2,Y2),
    Y is Y1+Y2,!.
```



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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q2.pl compiled, 10 lines read - 1230 bytes written, 16 ms
| ?- fib(8,X).

X = 21

yes
| ?- |

Q3. W.A.P.P to finding the greatest common divider (GCD) and the least common multiple (LCM) of two integers.

```
%function for GCD
gcd(M, 0, Result):- Result is M.
gcd(M, N, Result):-
    N>0,
    Rem is M mod N,
    gcd(N, Rem, Result),!.

%function for LCM
lcm(M,N,Result):-
    Result is abs(M*N)/gcd(M,N).
```



```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q3.pl compiled, 10 lines read - 1331 bytes written, 11 ms
| ?- gcd(10.4,X).
X = 2
yes
| ?- lcm(10.4,X).
X = 20.0
yes
| ?- |
```

Q4. W.A.P.P.

A. To find length of the list.

```
len([], LenResult):-
    LenResult is 0.
%X for avoiding singleton variable warning
len([_X|Y], LenResult):-
    len(Y, L),
    LenResult is L + 1,!.


```



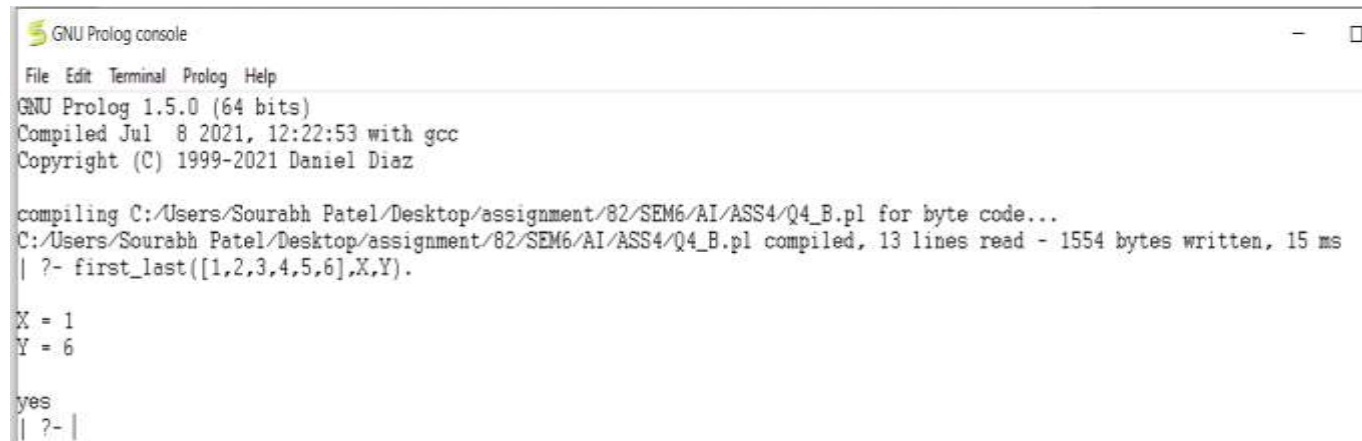
```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_A.pl compiled, 6 lines read - 768 bytes written, 27 ms
| ?- len([1,2,3,4,5,6],X).
X = 6
yes
```

B. To find first and last element of the list.

```
%M stores first element
%M stores last element
first_last([X|T],M,N):-
    M is X,
    last_element(T,N).

last_element([X|T],N):-
    (
        length(T,L),
        L:=0,
        N is X
    );
    last_element(T,N),!.
```



```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_B.pl compiled, 13 lines read - 1554 bytes written, 15 ms
| ?- first_last([1,2,3,4,5,6],X,Y).

X = 1
Y = 6
yes
| ?- |
```

C. To find the nth element of the list.

```
%H will store answer
nth_element([H|_],1,H).
nth_element([_|T],N,H) :-
    N > 1,
    N1 is N-1,
    nth_element(T,N1,H),!.
```



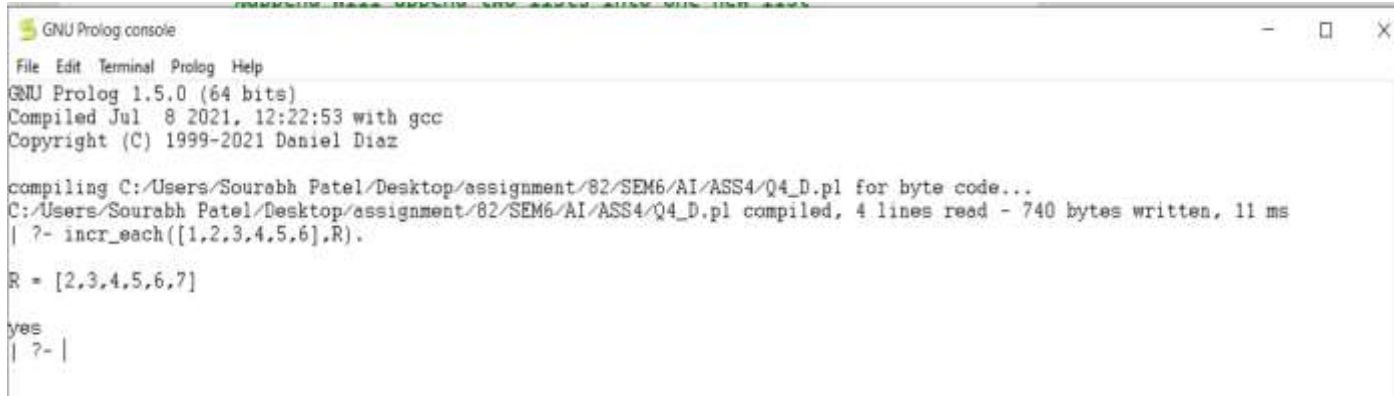
```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_C.pl compiled, 6 lines read - 972 bytes written, 10 ms
| ?- nth_element([1,2,3,4,5,6],4,X).

X = 4
yes
| ?- |
```

D. To increment each number in the list.

```
%incremented by one
%R is the result list
incr_each([],[]).
incr_each([H|T],[R|RT]):- R is H+1,incr_each(T,RT).
```



```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_D.pl compiled, 4 lines read - 740 bytes written, 11 ms
| ?- incr_each([1,2,3,4,5,6],R).

R = [2,3,4,5,6,7]

yes
| ?-
```

E. To reverse the list.

```
%reverse the list
%append will append two lists into one new list
list_reverse([],[]).
list_reverse([H|T],L):- list_reverse(T,R),append(R,[H],L).
```



```
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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_E.pl compiled, 4 lines read - 733 bytes written, 2
| ?- list_reverse([1,2,3,4,5,6],X).

X = [6,5,4,3,2,1]

yes
| ?-
```

F. To verify if a list has an even number of elements.

```
even([_,_]).
even([_,_|T]):- even(T),!.
```



```
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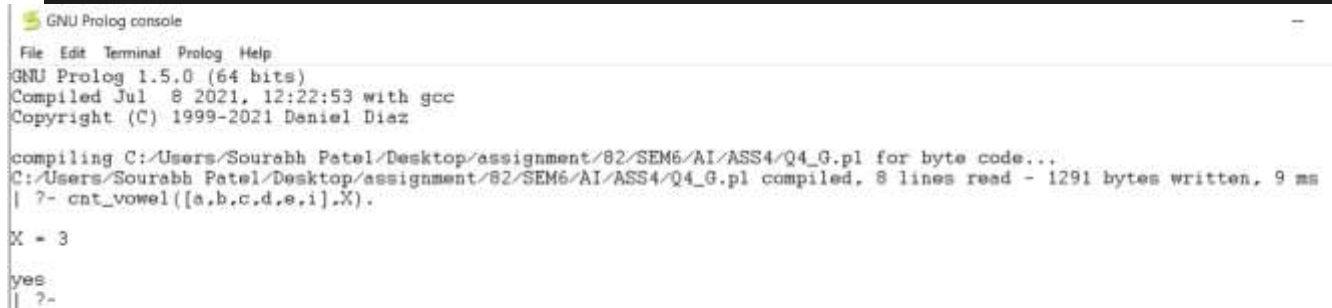
compiling C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_F.pl for byte code...
C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_F.pl compiled, 1 lines read - 638 bytes written, 9 ms
| ?- even([1,2,3,4,5]).

no
| ?- even([1,2,3,4,5,6]).

yes
| ?-
```

G. To count vowels in the list

```
vowel(a).
vowel(e).
vowel(i).
vowel(o).
vowel(u).
cnt_vowel([],0).
cnt_vowel([X|T],N):- vowel(X),cnt_vowel(T,N1),N is N1+1,!.
cnt_vowel([_|T],N):- cnt_vowel(T,N).
```



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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_G.pl compiled, 8 lines read - 1291 bytes written, 9 ms
| ?- cnt_vowel([a,b,c,d,e,i],X).
X = 3
yes
| ?-
```

H. To remove duplicates from the list.

```
%member function checks whether H is present in T
remove_duplicates([],[]):- !.
remove_duplicates([H|T],R):- member(H,T),remove_duplicates(T,R),!.
remove_duplicates([H|T],[R|Rest]):- R is H,remove_duplicates(T,Rest).
```



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C:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS4/Q4_H.pl compiled, 4 lines read - 1146 bytes written, 10 ms
| ?- remove_duplicates([1,2,4,5,6,4,1,3,2,4],R).
R = [5,6,1,3,2,4].
yes
| ?-
```