Artificial Intelligence Practical Record File

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SUBMITTED BY

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1. Write a prolog program to calculate the sum of two numbers.

Code:

```
sum :-
    write('Enter the first number: '),
    read(X),
    write('Enter the second number: '),
    read(Y),
    Z is X + Y,
    write('The sum is: '),
    write(Z).
```

Output:

2. Write a Prolog program to implement max(X, Y, M) so that M is the maximum of two numbers X and Y.

Code:

```
max(X, Y, M) :-
    write('Enter the first number: '),
    read(X),
    write('Enter the second number: '),
    read(Y),
```

```
    (X >= Y -> M = X; M = Y),
    write('The maximum number is: '),
    write(M).
```

Output:

3. Write a program in PROLOG to implement factorial (N, F) where F represents the factorial of a number N.

Code:

```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter the number: '), % Prompt for input
    read(N), % Read the N from user input

    factorial(N,F), % Call factorial predicate to find the factorial of
N
    write('Factorial: '), write(F), nl,  % Display the result
    halt. % Terminate the program

factorial(0,1).
factorial(N,F):-
```

```
    N>0,
    N1 is N-1,
    factorial(N1,F1),
    F is N*F1.
```

Output:

4. Write a program in PROLOG to implement generate_fib(N,T) where T represents the nth term of the fibonacci series.

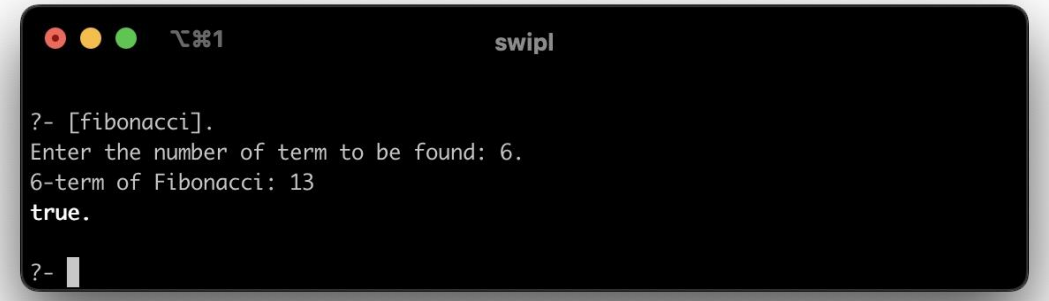
Code:

```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter the number of term to be found: '), % Prompt for input
    read(N), % Read the N from user input
    generate_fib(N,T),
    write(N), write('-term of Fibonacci: '), write(T), nl. % Display the
result

generate_fib(0,1).
generate_fib(1,1).
generate_fib(N,T) :-
    N1 is N-1,
    N2 is N-2,
    generate_fib(N1, T1),
    generate_fib(N2, T2),
    T is T1 + T2.
```

Output:



5. Write a Prolog program to implement GCD of two numbers.

Code:

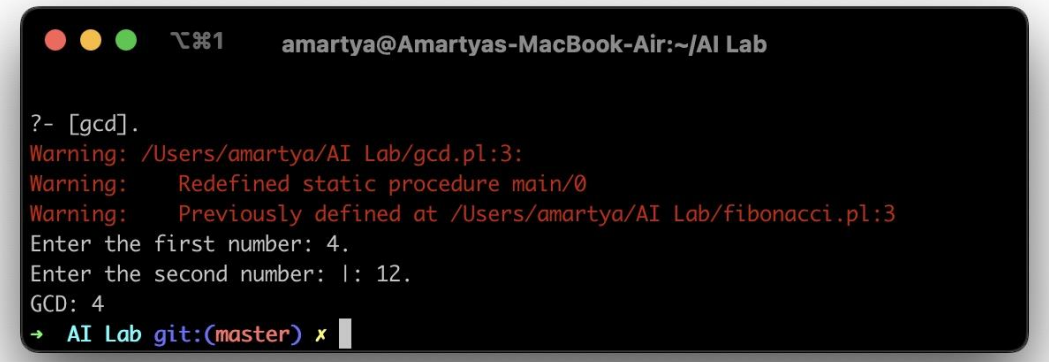
```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter the first number: '), % Prompt for input
    read(X), % Read the X from user input
    write('Enter the second number: '), % Prompt for input
    read(Y), % Read the Y from user input
    gcd(X, Y, Result), % Call gcd predicate to find GCD of two numbers
    write('GCD: '), write(Result), nl,  % Display the result
    halt. % Terminate the program

gcd(X,Y,Result):- (
    X=0 -> (
        Result is Y
    );
    Y=0 -> (
        Result is X
    );
    X=Y -> (
        Result is X
    );
    X>Y -> (
        Y1 is X-Y,
        gcd(Y1,Y,Result)
    );
    X<Y->(
        Y1 is Y-X,
        gcd(X,Y1,Result)
```

```
    )
).
```

Output:



6. Write a Prolog program to implement power (Num,Pow, Ans) : where Num is raised to the power Pow to get Ans.

Code:

```
power :-
    write('Enter the number: '),
    read(Num),
    write('Enter the power: '),
    read(Pow),
    power(Num, Pow, Ans),
    write(Num), write(' raised to the power of '), write(Pow),
    write(' is '), write(Ans), nl.

power(_, 0, 1).
power(Num, Pow, Ans) :-
    Pow > 0,
    NewPow is Pow - 1,
    power(Num, NewPow, NewAns),
    Ans is Num * NewAns.
```

Output:

7. Prolog program to implement multi (N1, N2, R) : where N1 and N2 denotes the numbers to be multiplied and R represents the result.

Code:

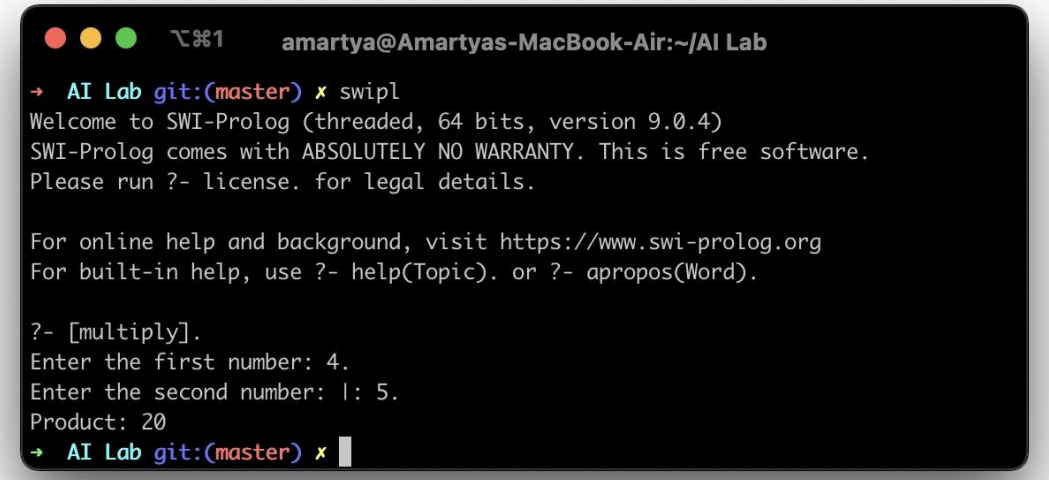
```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter the first number: '), % Prompt for input
    read(N1), % Read the N1 from user input
    write('Enter the second number: '), % Prompt for input
    read(N2), % Read the N2 from user input
    multi(N1, N2, R), % Call multi predicate to multiply N1 and N2
    write('Product: '), write(R), nl, % Display the result
    halt. % Terminate the program

multi(0, _, 0).
multi(_, 0, 0).
multi(N1, N2, R) :-

    R is N1 * N2.
```

Output:



8. Write a Prolog program to implement memb(X, L): to check whether X is a member of L or not.

Code:

```
memb :-
    write('Enter a list: '),
    read(L),
    write('Enter an element: '),
    read(X),
    memb(X, L),
    write(X), write(' is a member of '), write(L), nl.

memb(X, [X|_]).
memb(X, [_|T]) :- memb(X, T).
```

Output:

9. Write a Prolog program to implement conc (L1, L2, L3) where L2 is the list to be appended with L1 to get the resulted list L3.

Code:

```
conc :-
    write('Enter the first list: '),
    read(L1),
    write('Enter the second list: '),
    read(L2),
    conc(L1, L2, L3),
    write('The concatenated list is: '), write(L3), nl.

conc([], L, L).
conc([H|T], L2, [H|L3]) :- conc(T, L2, L3).
```

Output:

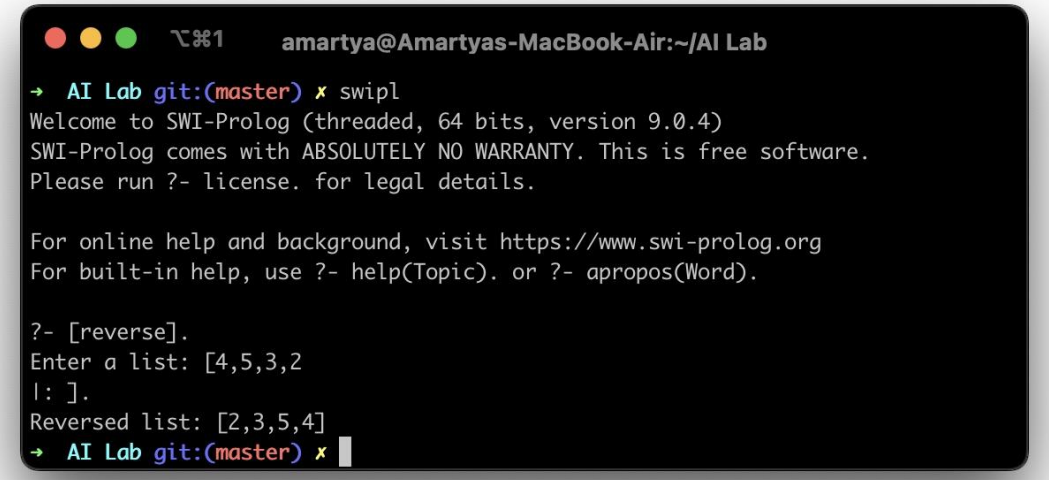
10. Write a Prolog program to implement reverse (L, R) where List L is original and List R is reversed list.

Code:

```
reverse([], []) :-
    !.
reverse([H|T], R) :-
    reverse(T, TR),
    append(TR, [H], R).

reverse(L, R) :-
    write('Enter the list: '),
    read(L),
    reverse(L, R),
    write('The reversed list of '), write(L), write(' is '), write(R).
```

Output:



11. Write a program in PROLOG to implement palindrome (L) which checks whether a list L is a palindrome or not.

Code:

```
palindrome :-
    write('Enter a list: '),
    read(L),
    palindrome(L),
    write('The list is a palindrome.').

palindrome(L) :- reverse(L, L).

reverse([], []).
reverse([H|T], R) :- reverse(T, TR), append(TR, [H], R).
```

Output:

12. Write a Prolog program to implement sumlist(L, S) so that S is the sum of a given list L.

Code:

```
sumlist([], 0).
sumlist([X|Xs], S) :-
  write('Enter the next element of the list: '),
  read(X),
  sumlist(Xs, S1),
  S is X + S1.
```

Output:

13. Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.

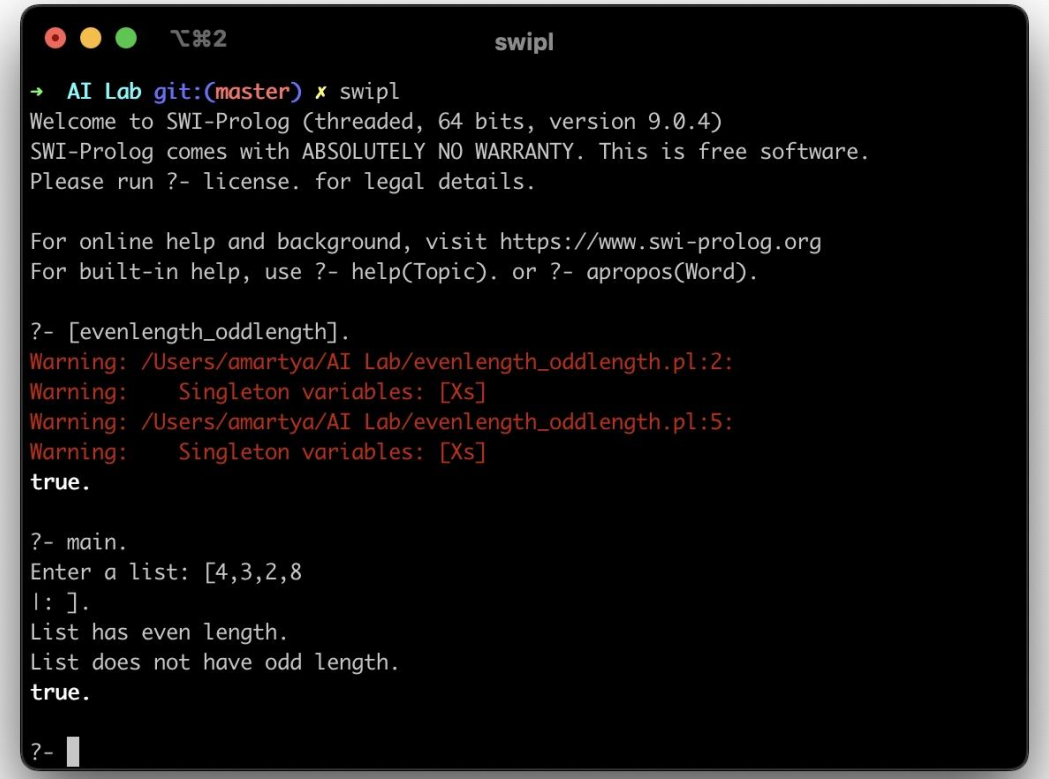
Code:

```
evenlength([]).
evenlength([_,Xs|T]) :- evenlength(T).

oddlength([_]).
oddlength([_,Xs|T]) :- oddlength(T).

main :-
  write('Enter a list: '),
  read(L),
  (evenlength(L) -> write('List has even length.') ; write('List does
not have even length.')),
  nl,
  (oddlength(L) -> write('List has odd length.') ; write('List does not
have odd length.')),
  nl.
```

Output:



14. Write a Prolog program to implement nth_element (N, L, X) where N is the desired position, L is a list and X represents the Nth element of L.

Code:

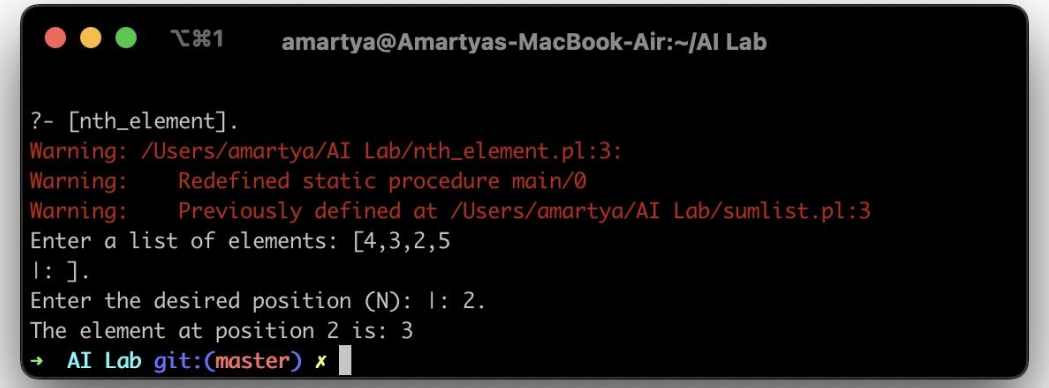
```
:- initialization(main).   % Call main predicate on program start

main :-
    write('Enter a list of elements: '), % Prompt for input
    read(L),  % Read the list from user input
    write('Enter the desired position (N): '), % Prompt for N
    read(N),  % Read N from user input
    nth_element(N, L, X),  % Call nth_element predicate to retrieve the
nth element
    write('The element at position '), write(N), write(' is: '),
write(X), nl,  % Display the result
    halt.  % Terminate the program

nth_element(1, [X | _], X).  % Base case: N=1, the desired position,
```

```
retrieve the head of the list
nth_element(N, [_ | L], X) :-
    N > 1,  % Ensure N is a positive integer
    N1 is N - 1,  % Decrement N by 1
    nth_element(N1, L, X).  % Recursive rule: retrieve the nth element
from the tail of the list
```

Output:



15. Write a Prolog program to implement maxlist(L, M) so that M is the maximum number in the list.

Code:

```
% Read a list from the user
read_list(L) :-
    write('Enter a list: '),
    read(L).

% Find the maximum number in a list
maxlist(L, M) :-
    max_list(L, M).

% Main predicate to read the list and find the maximum number
main :-
    read_list(L),
    maxlist(L, M),
    write('The maximum number in '), write(L), write(' is '), write(M).
```

Output:

16. Write a prolog program to implement insert_nth (I, N, L, R) that inserts an item I into Nth position of list L to generate a list R.

Code:

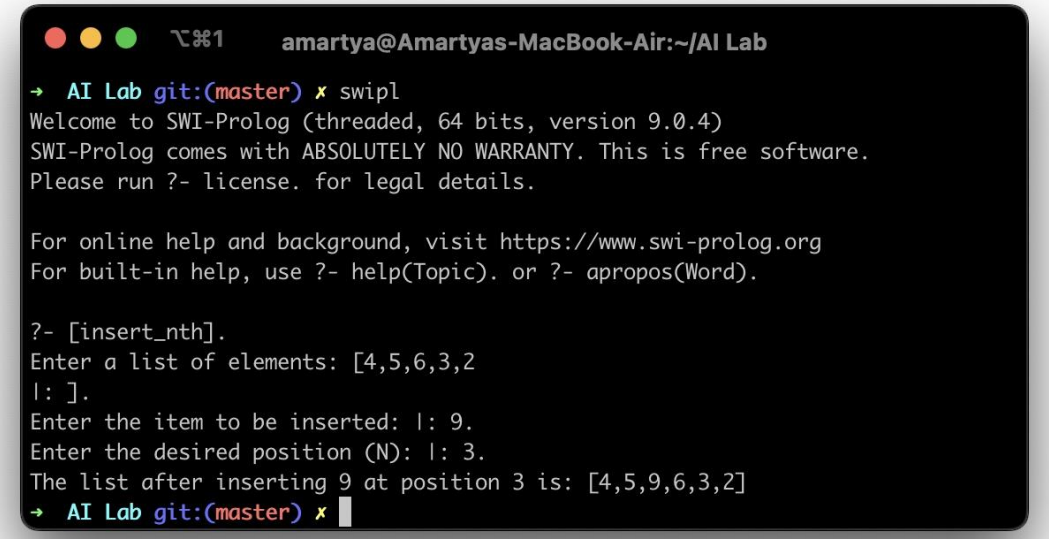
```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter a list of elements: '), % Prompt for input
    read(L), % Read the list from user input
    write('Enter the item to be inserted: '), % Prompt for I
    read(I), % Read I from user input
    write('Enter the desired position (N): '), % Prompt for N
    read(N), % Read N from user input
    insert_nth(I, N, L, R), % Call insert_nth predicate to insert I into
the nth position of L
    write('The list after inserting '), write(I), write(' at position
'), write(N), write(' is: '), write(R), nl, % Display the result
    halt. % Terminate the program

insert_nth(I, 1, L, [I | L]). % Base case: insert I as the head of the
list when N=1
insert_nth(I, N, [X | L], [X | R]) :-
    N > 1, % Ensure N is a positive integer
```

```
    N1 is N - 1, % Decrement N by 1
    insert_nth(I, N1, L, R). % Recursive rule: insert I into the (N-1)th
position of the tail of the list
```

Output:



17. Write a Prolog program to implement delete_nth (N, L, R) that removes the element on Nth position from a list L to generate a list R.

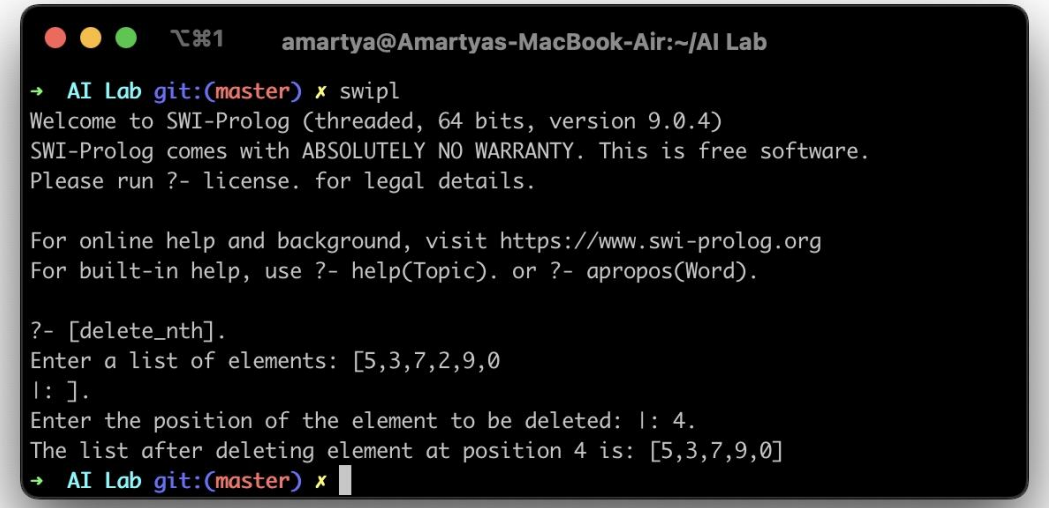
Code:

```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter a list of elements: '), % Prompt for input
    read(L), % Read the list from user input
    write('Enter the position of the element to be deleted: '), % Prompt
for N
    read(N), % Read N from user input
    delete_nth(N, L, R), % Call delete_nth predicate to remove Nth
element from L
    write('The list after deleting element at position '), write(N),
write(' is: '), write(R), nl, % Display the result
    halt. % Terminate the program
```

```
delete_nth(1, [_ | L], L). % Base case: remove head element when N=1
delete_nth(N, [X | L], [X | R]) :-
    N > 1, % Ensure N is a positive integer
    N1 is N - 1, % Decrement N by 1
    delete_nth(N1, L, R). % Recursive rule: remove Nth element from tail
of the list
```

Output:



18. Write a program in PROLOG to implement merge (L1, L2, L3) where L1 is first ordered list and L2 is second ordered list and L3 represents the merged list.

Code:

```
:- initialization(main). % Call main predicate on program start

main :-
    write('Enter the first ordered list: '), % Prompt for input
    read(L1), % Read the first ordered list from user input
    write('Enter the second ordered list: '), % Prompt for input
    read(L2), % Read the second ordered list from user input
    merge(L1, L2, L3), % Call merge predicate to merge L1 and L2
    write('The merged list is: '), write(L3), nl, % Display the result
    halt. % Terminate the program

merge([], L, L). % Base case: if L1 is empty, merged list is L2
```

```
merge(L, [], L). % Base case: if L2 is empty, merged list is L1
merge([X | L1], [Y | L2], [X | L3]) :-
    X =< Y, % Compare the heads of L1 and L2
    merge(L1, [Y | L2], L3). % Recursive rule: if X <= Y, merge the
tails of L1 and L2
merge([X | L1], [Y | L2], [Y | L3]) :-
    X > Y, % Compare the heads of L1 and L2
    merge([X | L1], L2, L3). % Recursive rule: if X > Y, merge the tails
of L1 and L2
```

Output: