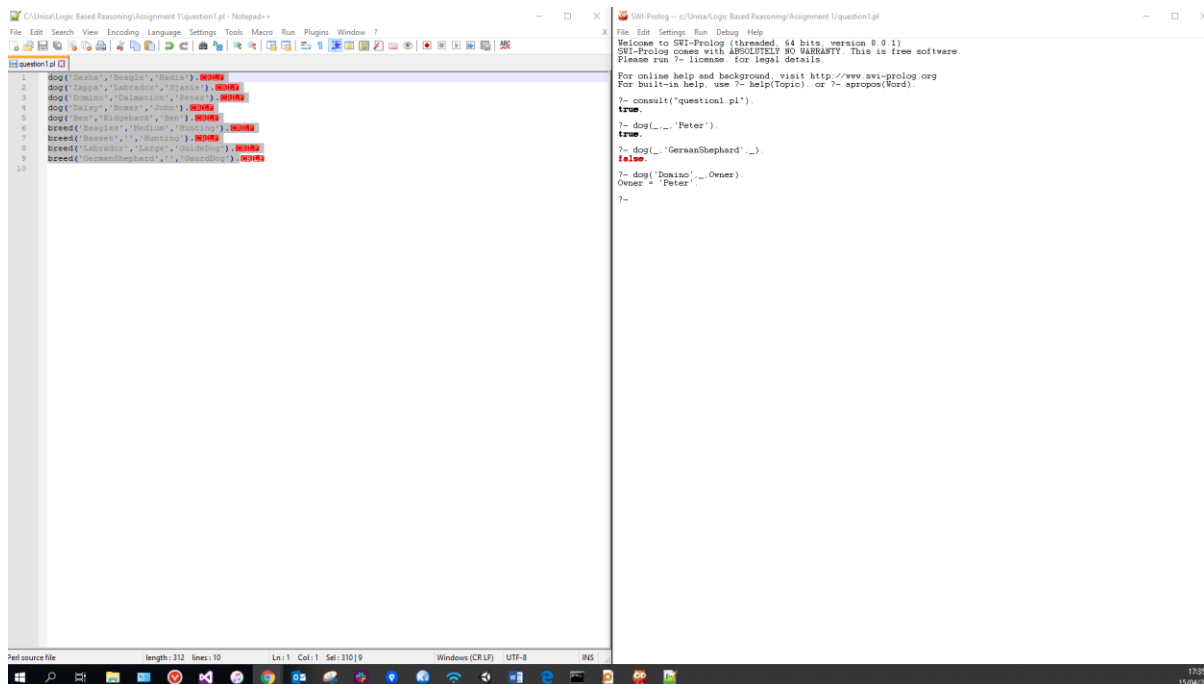


Question 1a + Question 1b



The screenshot shows a Prolog environment with two windows. The left window, titled 'question1.pl', contains a list of dog breeds and their owners. The right window, titled 'SWI-Prolog -- c:\Users\Logic Based Reasoning\Assignment 1\question1.pl', shows the output of a query.

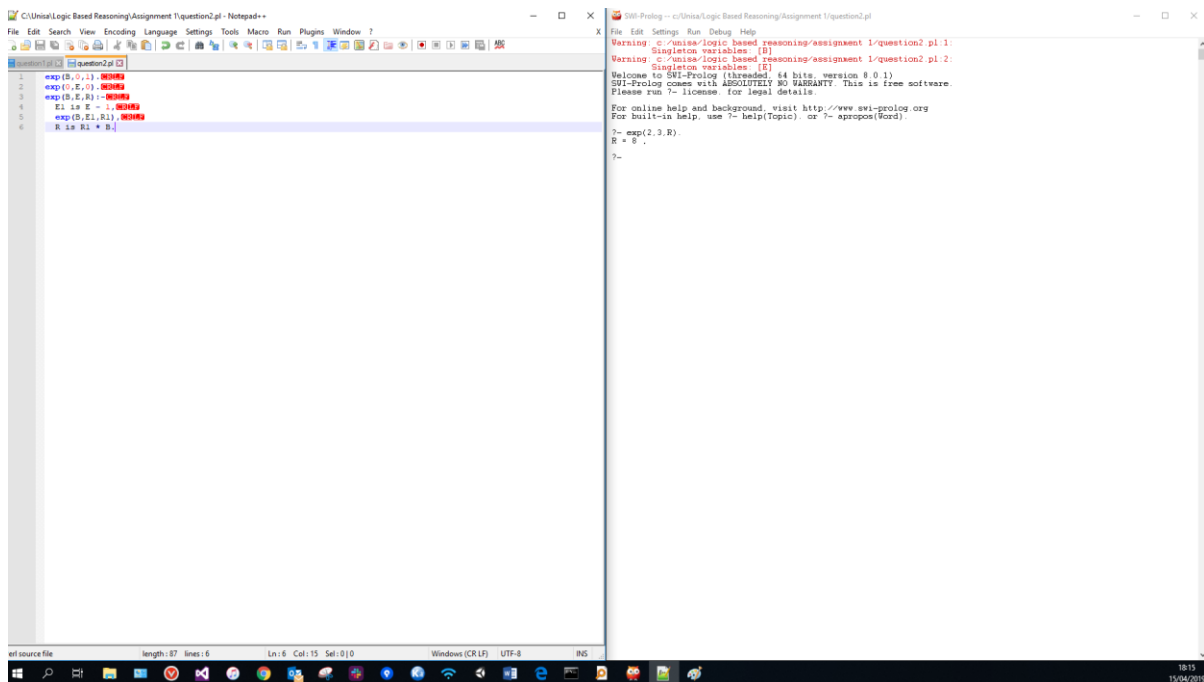
```
1 dog('Duke', 'Beagle', 'Marta').
2 dog('Fido', 'Labrador', 'John').
3 dog('Bella', 'GoldenRetriever', 'John').
4 dog('Max', 'BorderCollie', 'John').
5 dog('Ben', 'Ridgeback', 'Ben').
6 breed('Beagle', 'Medium', 'Marta').
7 breed('BorderCollie', 'Medium', 'John').
8 breed('Labrador', 'Large', 'John').
9 breed('GermanShepherd', 'Large', 'John').
```

```
?- consult('question1.pl').
true.
?- dog(_, 'Peter').
true.
?- dog(_, 'GermanShepherd').
false.
?- dog('Duke', _Owner).
Owner = 'Marta'.
?-
```

Question 1c

1. Scan program to find a match for any dog with any first parameter.
2. Scan if any of those dogs have a second parameter that equals 'GermanShepherd'
3. No dog can be found with 2nd parameter equal to 'GermanShepherd'

Question 2

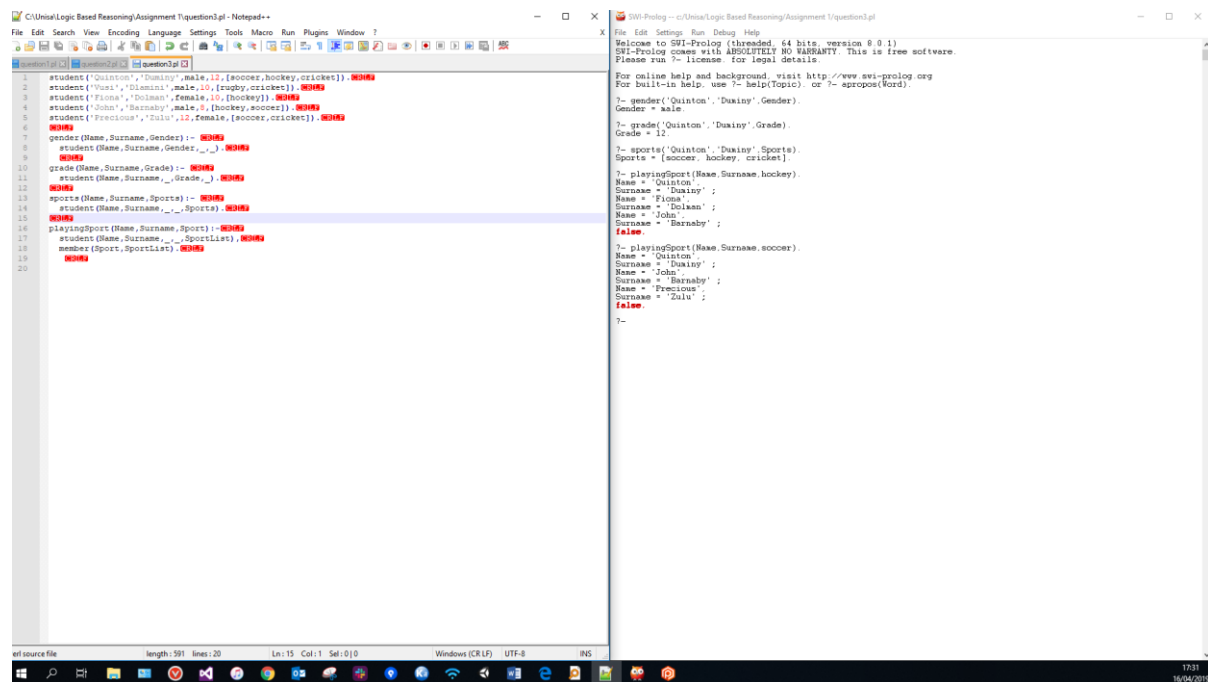


The screenshot shows a Prolog environment with two windows. The left window, titled 'question2.pl', contains a query. The right window, titled 'SWI-Prolog -- c:\Users\Logic Based Reasoning\Assignment 1\question2.pl', shows the output of the query.

```
1 exp(0, 0, 0).
2 exp(0, 0, 0).
3 exp(0, 0, 0).
4 E1 is E - 1.
5 exp(0, E1, 0).
6 R is R1 * B.
```

```
?- exp(2, 3, R).
R = 8.
?-
```

Question 3



```
1 student('Quinton','Duminy',male,12,[soccer,hockey,cricket]).
2 student('Vusi','Dlamini',male,10,[rugby,cricket]).
3 student('Fiona','Dolman',female,10,[hockey]).
4 student('John','Barnaby',male,10,[hockey,soccer]).
5 student('Precious','Zulu',12,female,[soccer,cricket]).
6
7 gender(Name,Surname,Gender):-
8     student(Name,Surname,Gender,_).
9
10 grade(Name,Surname,Grade):-
11     student(Name,Surname,_,Grade).
12
13 sports(Name,Surname,Sports):-
14     student(Name,Surname,_,Sports).
15
16 playingSport(Name,Surname,Sport):-
17     student(Name,Surname,_,SportsList),
18     member(Sport,SportsList).
19
20
```

SWI-Prolog -- c:\Users\Logic Based Reasoning\Assignment 1\question3.pl

File Edit Settings Run Debug Help

Welcome to SWI-Prolog (threaded, 64 bits, version 8.0.1)

SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software. Please run ?- license for legal details.

For online help and background, visit <http://www.swi-prolog.org>

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

?- gender('Quinton','Duminy',Gender).

Gender = male

?- grade('Quinton','Duminy',Grade).

Grade = 12

?- sports('Quinton','Duminy',Sports).

Sports = [soccer, hockey, cricket]

?- playingSport(Name,Surname,hockey).

Name = 'Quinton' ;

Surname = 'Duminy' ;

Name = 'Fiona' ;

Surname = 'Dolman' ;

Name = 'John' ;

Surname = 'Barnaby' ;

false

?- playingSport(Name,Surname,soccer).

Name = 'Quinton' ;

Surname = 'Duminy' ;

Name = 'John' ;

Surname = 'Barnaby' ;

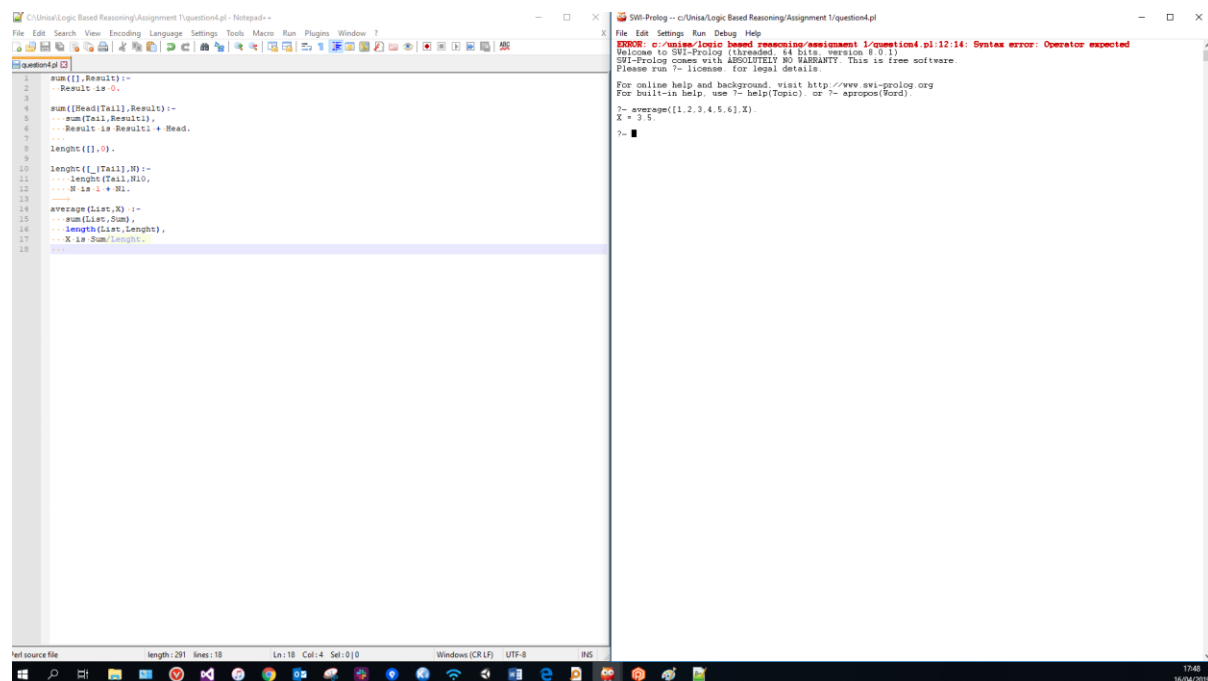
Name = 'Precious' ;

Surname = 'Zulu' ;

false

?-

Question 4



```
1 sum([],Result):-
2     Result is 0.
3
4 sum([_Head|Tail],Result):-
5     sum(Tail,Result),
6     Result is Result + Head.
7
8 lenght([],0).
9
10 lenght([_|Tail],N):-
11     lenght(Tail,N10),
12     N is 1 + N10.
13
14 average(List,N):-
15     sum(List,Sum),
16     lenght(List,Length),
17     N is Sum/Length.
18
```

SWI-Prolog -- c:\Users\Logic Based Reasoning\Assignment 1\question4.pl

File Edit Settings Run Debug Help

ERROR: c:\Users\Logic Based Reasoning\Assignment 1\question4.pl:12:14: Syntax error: Operator expected

Welcome to SWI-Prolog (threaded, 64 bits, version 8.0.1)

SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software. Please run ?- license for legal details.

For online help and background, visit <http://www.swi-prolog.org>

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

?- average([1,2,3,4,5,6],X).

X = 3.5

?-

Question 5a

Yes

X= [a,b,c,d,e]

Y=[]

Question 5b

Yes

X=[a]

Question 5c

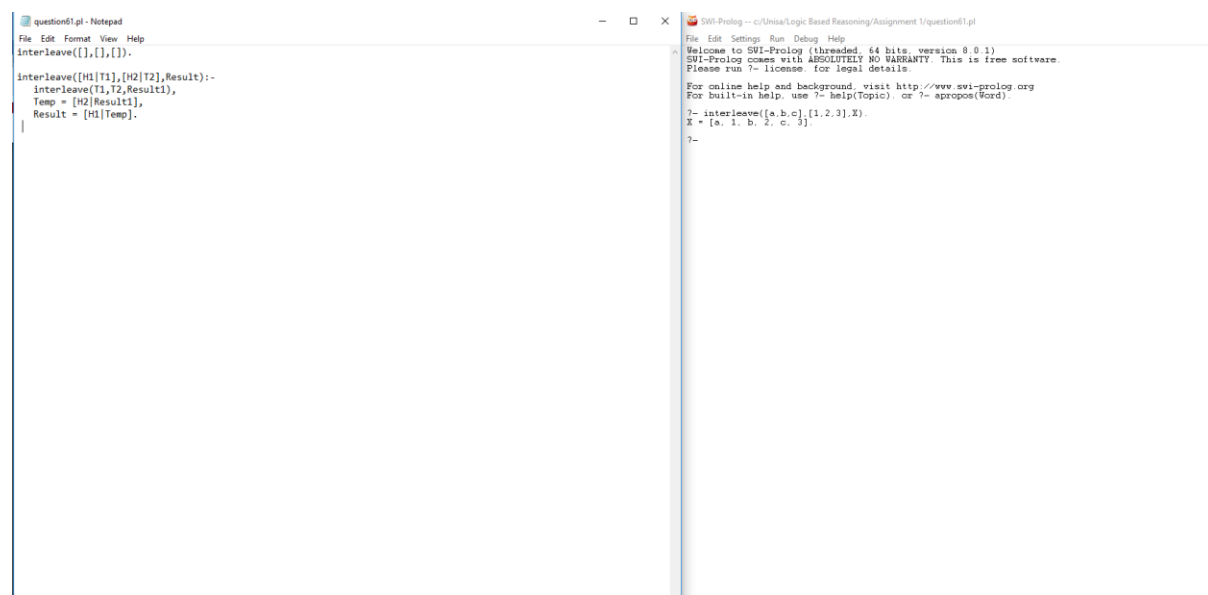
Yes

X=[predb(1,mill_14)]

Y=[cdc]

Z=[8,9]

Question 6.a



The screenshot shows a Prolog environment with two windows. The left window, titled 'question61.pl - Notepad', contains the following Prolog code:

```
File Edit Format View Help
interleave([],[],[]).

interleave([H1|T1],[H2|T2],Result):-
    interleave(T1,T2,Result1),
    Temp = [H2|Result1],
    Result = [H1|Temp].
```

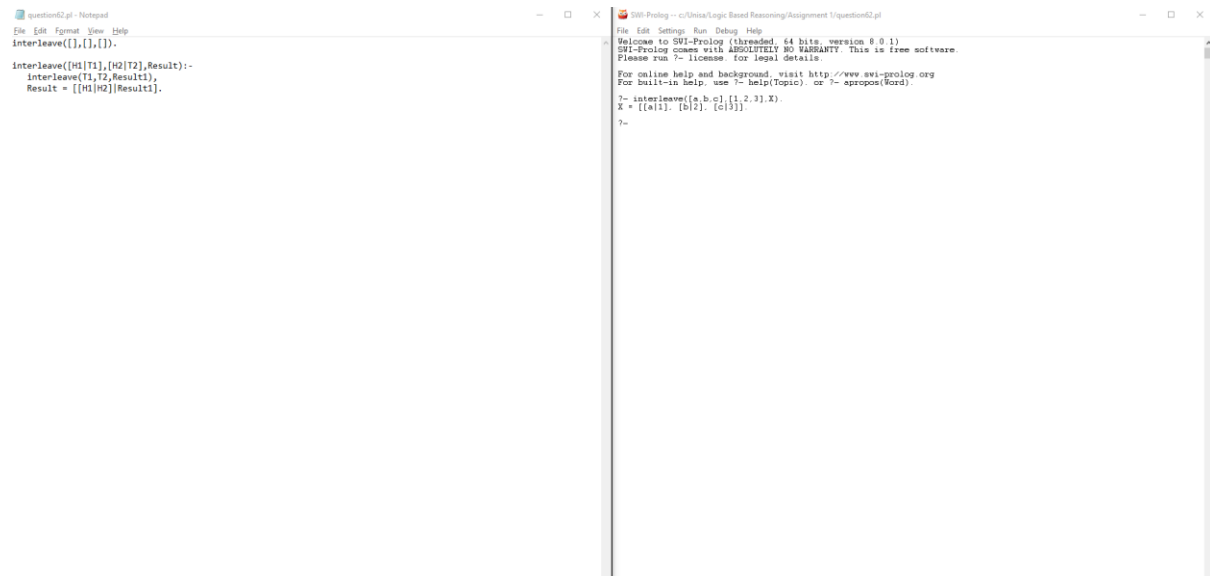
The right window, titled 'SWI-Prolog -- c:\Unisa\Logic Based Reasoning\Assignment 1\question61.pl', shows the Prolog prompt and the execution of the code:

```
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 8.0.1)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license for legal details.
For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- interleave([a,b,c],[1,2,3],X).
X = [a, 1, b, 2, c, 3].
?-
```

Input is not reversable because that will give a different result

Question 6b



The screenshot shows two windows. The left window is Notepad, titled 'question62.pl - Notepad', containing the following Prolog code:

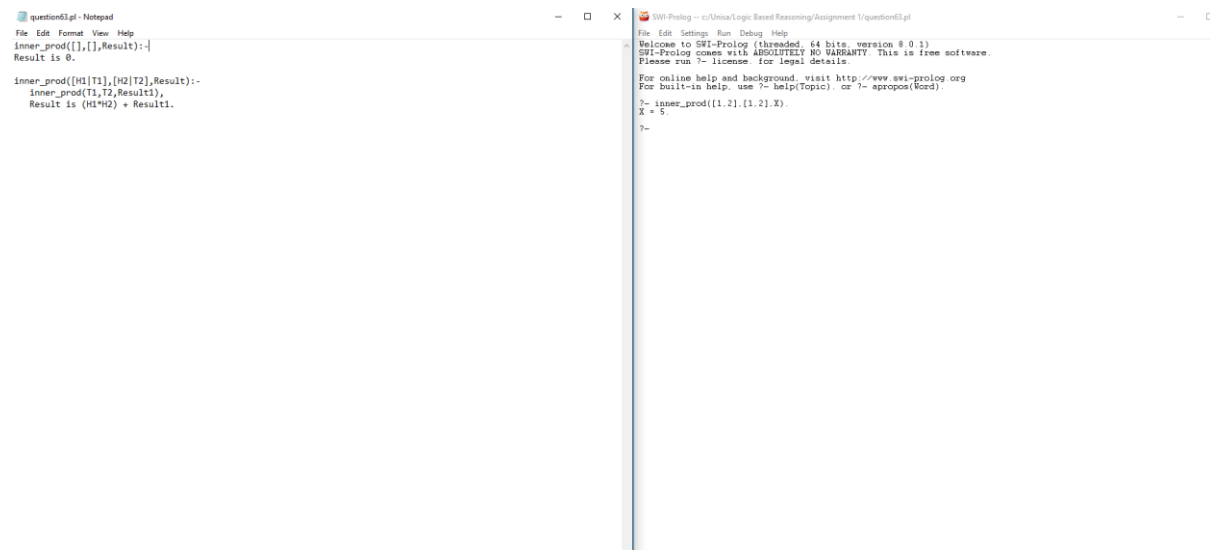
```
interleave([],[],[]).  
  
interleave([H1|T1],[H2|T2],Result):-  
    interleave(T1,T2,Result1),  
    Result = [[H1|H2]|Result1].
```

The right window is SWI-Prolog, titled 'SWI-Prolog -- c:/Unisa/Logic Based Reasoning/Assignment 1/question62.pl'. It displays the Prolog prompt and the execution of the code:

```
File Edit Settings Run Debug Help  
Welcome to SWI-Prolog (threaded, 64 bits, version 8.0.1)  
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.  
Please run ?- license. for legal details.  
  
For online help and background, visit http://www.swi-prolog.org  
For built-in help, use ?- help(Topic). or ?- apropos(Word).  
  
?- interleave([a,b,c],[1,2,3],X).  
X = [[a|1], [b|2], [c|3]].  
?-
```

Input is not reversible because that will give a different result

Question 6c



The screenshot shows two windows. The left window is Notepad, titled 'question63.pl - Notepad', containing the following Prolog code:

```
inner_prod([],[],Result):-  
    Result is 0.  
  
inner_prod([H1|T1],[H2|T2],Result):-  
    inner_prod(T1,T2,Result1),  
    Result is (H1*H2) + Result1.
```

The right window is SWI-Prolog, titled 'SWI-Prolog -- c:/Unisa/Logic Based Reasoning/Assignment 1/question63.pl'. It displays the Prolog prompt and the execution of the code:

```
File Edit Settings Run Debug Help  
Welcome to SWI-Prolog (threaded, 64 bits, version 8.0.1)  
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.  
Please run ?- license. for legal details.  
  
For online help and background, visit http://www.swi-prolog.org  
For built-in help, use ?- help(Topic). or ?- apropos(Word).  
  
?- inner_prod([1,2],[1,2],X).  
X = 5.  
?-
```

Input is reversible