Submitted To : Ma’am Neha

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Course: B.Sc (hons.) Computer Science, III Year, VI Semester

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Practical file for Core Paper XIII: Artificial Intelligence

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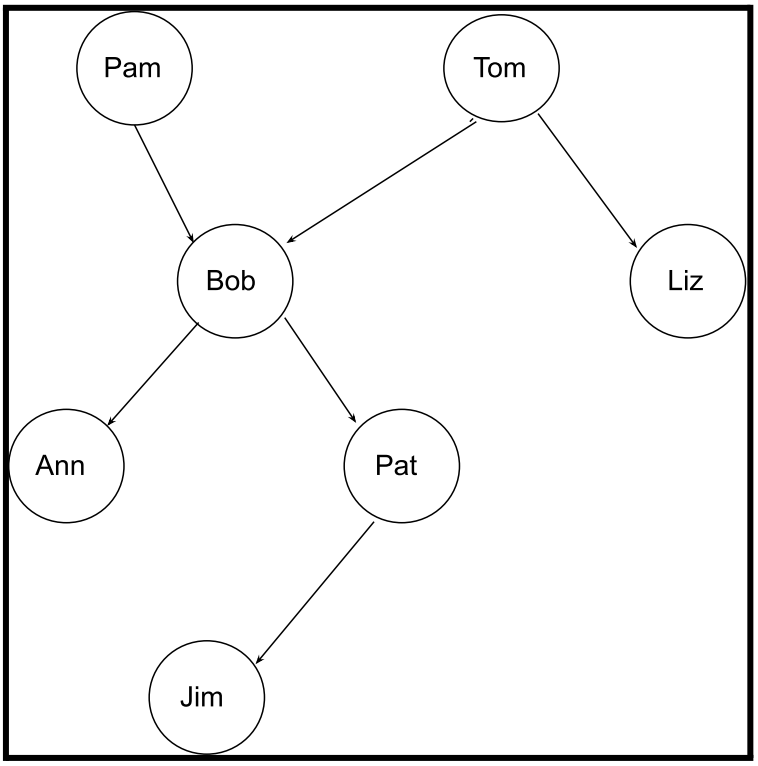
PRACTICAL 1

FAMILY TREE



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PROLOG CODE

```
female(liz).
female(pat).
female(ann).
male(tom).
male(bob).
male(jim).

parent(pam, bob).
parent(tom, bob).
parent(tom, liz).
parent(bob, ann).
parent(bob, pat).
parent(pat, jim).

grandparent(X, Z) :-
  parent(X, Y),
  parent(Y, Z).

same_parent(X, Y) :-
  parent(Z, X),
  parent(Z, Y),
  X \= Y.

has_child(X) :-
  parent(X, _).

offspring(X, Y) :-
  parent(X, Y).

mother(X, Y) :-
  parent(X,Y),
  female(X).
```

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```
sister(X, Y) :-
  same_parent(X, Y),
  female(X).

happy(X) :-
  has_child(X).

hastwochildren(X) :-
  parent(X, Y),
  sister(Y,_).

grandchild(X, Z) :-
  parent(Y, X),
  parent(Z, Y).

aunt(X,Y) :-
  parent(Z,Y),
  sister(X,Z).

predecessor(X, Z) :-
  parent(X, Z).

predecessor(X, Z) :-
  parent(X, Y),
  predecessor(Y, Z).

% New relations
maternalgrandmother(X,Y) :-
  mother(X,Z),
  parent(Z,Y).

maternalgrandfather(X,Y) :-
  parent(X,Z),
```

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```
  mother(Z,Y),
  male(X).

paternalgrandmother(X,Y) :-
  mother(X,Z),
  parent(Z,Y),
  male(Z).

paternalgrandfather(X,Y) :-
  parent(X,Z),
  parent(Z,Y),
  male(X).
```

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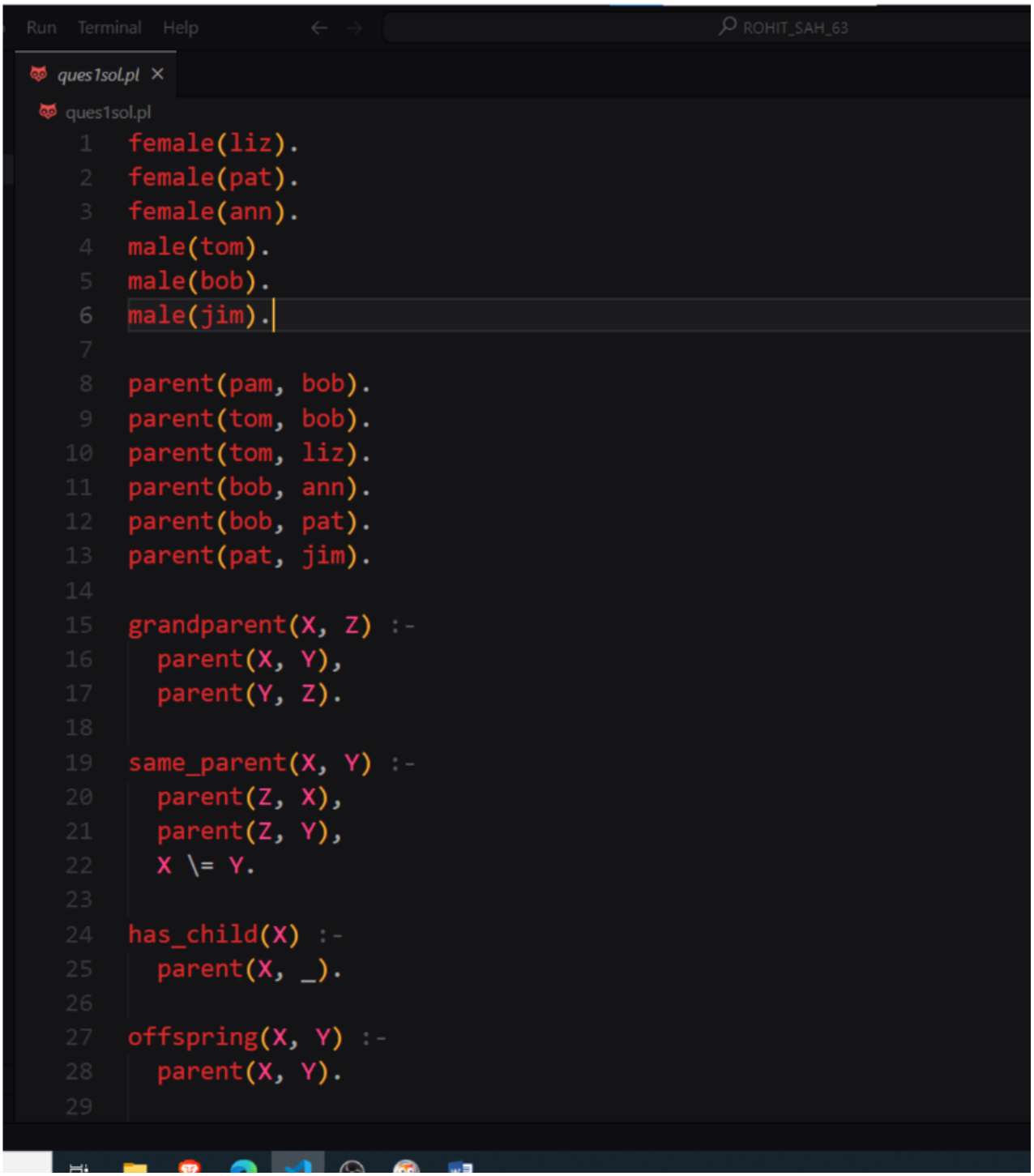
WINDOW SCREEN SHOT



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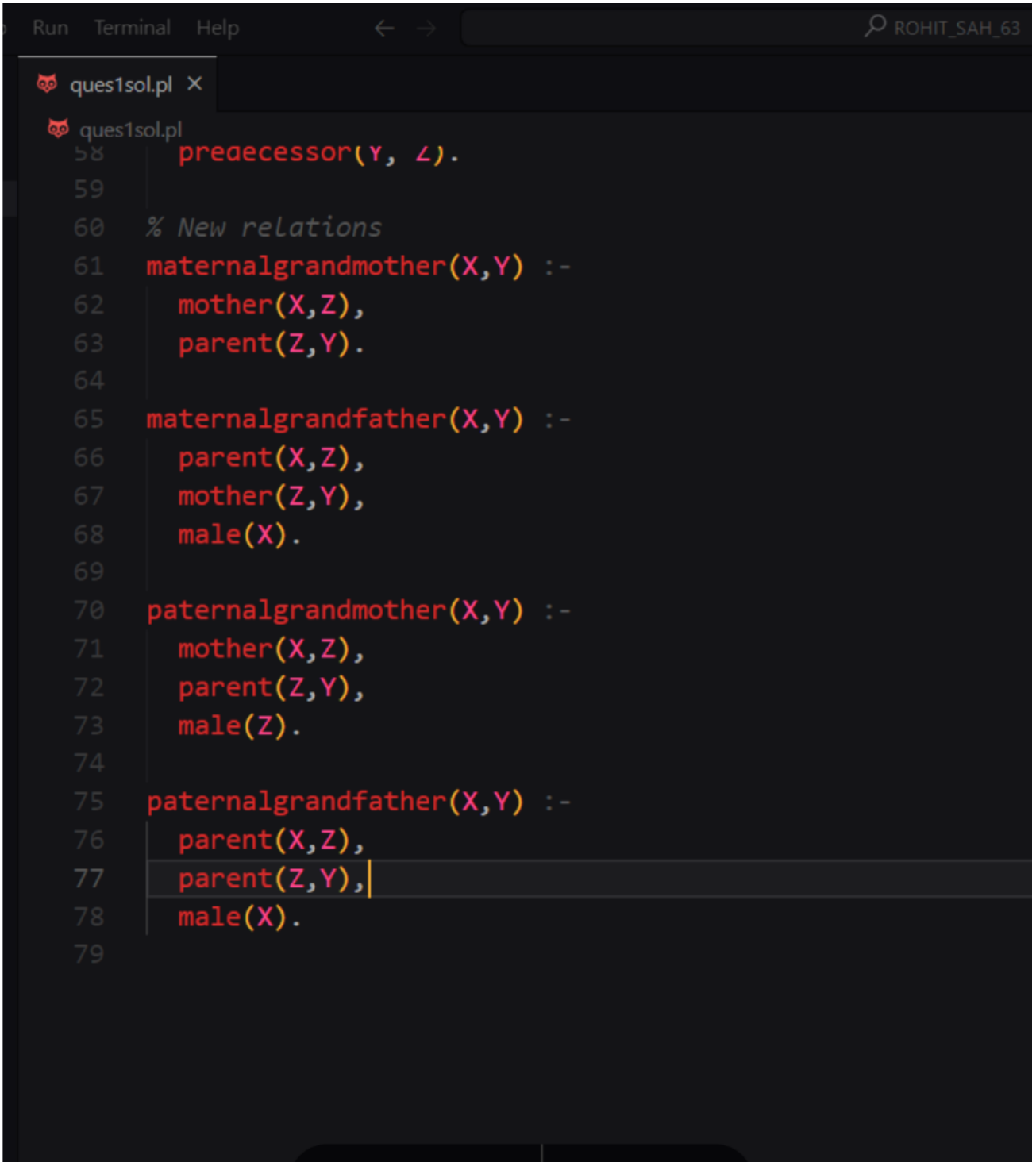

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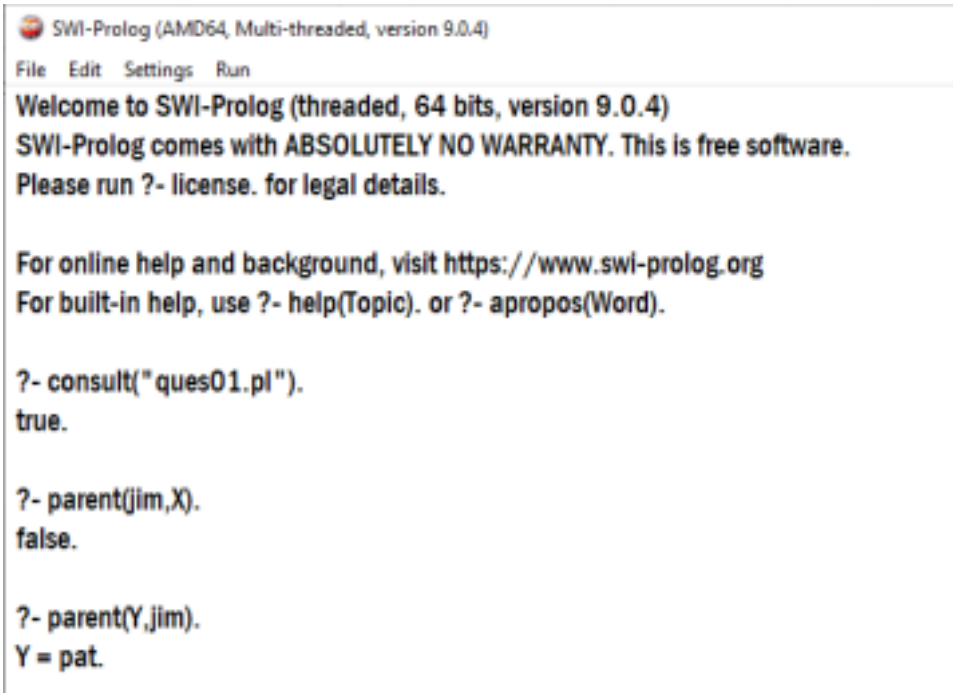
QUERIES:

i) Who is Jim's parents? Assume this is some Y.



ii) Who is the parent of X, of Ann.

```
?- parent(X,ann).
X = bob.
```

iii) Is this same X a parent of Pat?

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```
?- parent(pam,X),parent(X,pat).
X = bob.
```

Who is Pat's parent?

```
?- parent(X, pat).
X = bob.
```

Does Liz have a child?

```
?- parent(liz,Y).
false.

?-
```

Who is pat's grandparent?

```
?- grandparent(X,pat).
X = pam
```

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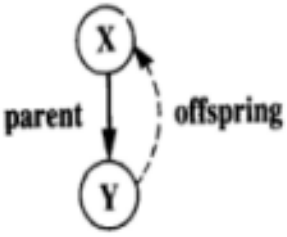
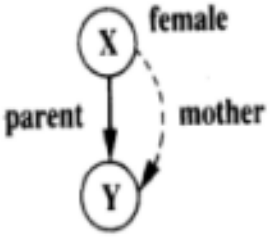
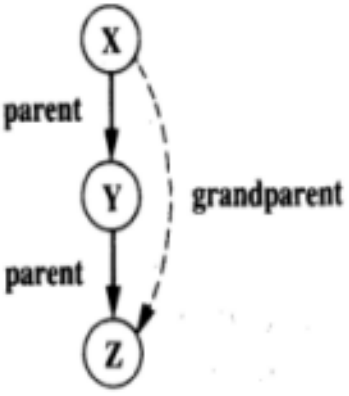
Diagram Reference:








```
?- parent(pam,bob).
true.

?- mother(pam,bob).
false.

?- grandparent(pam,ann).
true.

?- grandparent(bob,jim).
true.

?-
```

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Diagram References:

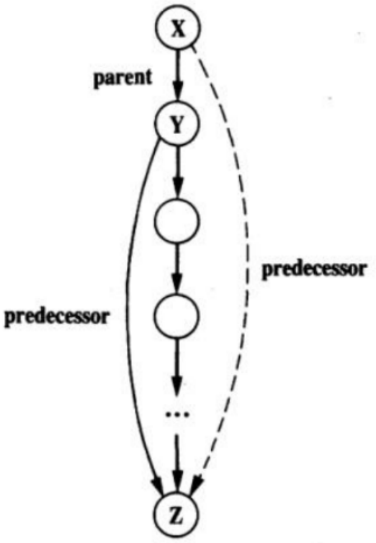

Figure 1.7 Recursive formulation of the **predecessor** relation.

RELATION DEFINED IN PROLOG

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```
53  predecessor(X, Z) :-
54    parent(X, Z).
55
56  predecessor(X, Z) :-
57    parent(X, Y),
58    predecessor(Y, Z).
59
```

PREDECESSOR QUERY

```
SWI-Prolog (AMD64, Multi-threaded, version 9.0.4)
File  Edit  Settings  Run
Welcome to SWI-Prolog (threaded, 64 bits, version 9.0.4)
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("ques1sol.pl").
true.

?- predecessor(tom,pat).
true
```

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```
?- predecessor(tom,pat).
true .

?- predecessor(Y,pat).
Y = bob
```

Define the relations in terms of parent relation.

(a) maternalgrandmother(X,Y)

(b) maternalgrandfather(X,Y)

(c) paternalgrandmother(X,Y)

(d) paternalgrandfather(X,Y)

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```
% New relations
maternalgrandmother(X,Y) :-
  mother(X,Z),
  parent(Z,Y).

maternalgrandfather(X,Y) :-
  parent(X,Z),
  mother(Z,Y),
  male(X).

paternalgrandmother(X,Y) :-
  mother(X,Z),
  parent(Z,Y),
  male(Z).

paternalgrandfather(X,Y) :-
  parent(X,Z),
  parent(Z,Y),
  male(X).
```

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