PROLOG SOLUTION

**Question 1.**

%Nth term of fibonacci

fibo(1, 0).

fibo(2, 1).

fibo(N, R) :-

N1 is N-1, N2 is N-2,

fibo(N1, R1),fibo(N2, R2),

R is R1 + R2.

?-fibo(6,W),write(W).

**Question 2.A**

%family tree

parent(hari,jodu).

parent(jodu,rekha).

wife(nitu,jodu).

parent(hari,shyam).

parent(shyam,ram).

parent(shyam,sita).

parent(moli,sita).

parent(rekha,boby).

brother(ram,sita).

female(sita).

female(boby).

male(jodu).

sister(rekha,rakhi).

male(hari).

sister(X,Y):-brother(Y,X),female(X).

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

grandfather(X,Y):-parent(W,Y),parent(X,W),male(X).

grandfather(X,Y):-parent(W,Y),parent(X,W),female(X).

?-brother(X,sita),write(X),ln,nl.

?-nl,sister(X,ram),write(X),ln.

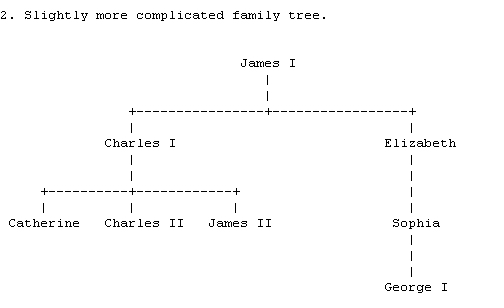
?-nl,mother(P,ram),write(P).

?-nl,grandfather(A,sita),write(A).

?-nl,grandfather(A,boby),write(A).

?-mother(A,rekha),write(X).

Question 2B.



Here are the resultant clauses:

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male(james1).

male(charles1).

male(charles2).

male(james2).

male(george1).

female(catherine).

female(elizabeth).

female(sophia).

parent(charles1, james1).

parent(elizabeth, james1).

parent(charles2, charles1).

parent(catherine, charles1).

parent(james2, charles1).

parent(sophia, elizabeth).

parent(george1, sophia).

Here is how you would formulate the following queries:

Was George I the parent of Charles I?

Query: parent(charles1, george1).

Who was Charles I's parent?

Query: parent(charles1,X).

Who were the children of Charles I?

Query: parent(X,charles1).

Now try expressing the following rules:

M is the mother of X if she is a parent of X and is female

F is the father of X if he is a parent of X and is male

X is a sibling of Y if they both have the same parent.

Furthermore add rules defining:

"sister", "brother",

"aunt", "uncle",

"grandparent", "cousin"

**Question 3.**

%factorial of N

factorial(0,1).

factorial(N,F) :-

N>0,N1 is N-1,

factorial(N1,F1),

F is N \* F1.

?- factorial(5,W),write(W).

**Question 4.**

%gcd of Aanb B

gcd(A, 0, A).

gcd(A, B, D) :- (A>B),(B>0),R is A modB,gcd(B,R,D).

gcd(A, B, D) :- (A<B),gcd(B,A,D).

?-gcd(50,15,D), write(D).

**Question 5.**

%search an elememt

arr(X,[X|\_],1).

arr(X,[\_|Y],N):-arr(X,Y,N1),N is N1+1.

?-arr(6,[2,3,4,5,6,12],N),write(N).

**Question 6.**

%reverse list

reverse([],X,X).

reverse([X|Y],Z,W) :- reverse(Y,[X|Z],W).

% reverse([1,2,3],[],A)

% |

% reverse([2,3],[1],A)

% |

% |

% reverse([3],[2,1],A)

% |

% |

% reverse([],[3,2,1],A)

% |

% |

% true

% A = [3,2,1]

?-reverse([4,2,3],[],A),write(A).

**Question 7.**

**%LIST CONCATENATION**

list([],L,L).

list([X|Y],M,[X|N]):- list(Y,M,N).

?- list([1,2,3],[4,5,6],P),write(P).

**Question 8.**

% DELETE ELEMENT FORM LIST

list(X,[X|Y],Y).

list(X,[M|P],[M|Q]):- list(X,P,Q).

?-list(34,[5,7,8,34,77],W),write(W).

**Question 9.**

**% FIBONACCI LIST**

fibLi(P,L):-fibs(P,K),reverse(K,[],L).

fibs(0,[]).

fibs(X,[F|Y]):-X1 is X-1,fib(X,F),fibs(X1,Y).

fib(1,0).

fib(2,1).

fib(N,F):-N1 is N-1,N2 is N1-1,fib(N1,F1),fib(N2,F2),F is F1+F2.

reverse([X|Y],Z,W):-reverse(Y,[X|Z],W).

reverse([],X,X).

?-fibLi(6,F),write(F).

**Question 10.**

%GRAPH PATH

edge(1,2).

edge(1,4).

edge(1,3).

edge(2,3).

edge(2,5).

edge(3,4).

edge(3,5).

edge(4,5).

connected(X,Y):-edge(X,Y);edge(Y,X).

member(X,[X|R]).

member(X,[Y|R]):-member(X,R).

reverse([X|Y],Z,R):-reverse(Y,[X|Z],R).

reverse([],X,X).

path(A,B,Path):- travel(A,B,[A],Q),reverse(Q,[],Path).

travel(A,B,P,[B|P]):-connected(A,B).

travel(A,B,Visited,Path):-connected(A,C),C\==B,not(member(C,Visited)),

travel(C,B,[C|Visited],Path).

?-path(1,5,P),write("P="),write(P),nl,ln.