Prolog:

Q3 2015

A).

s --> u(X), u(X), [2], v(X).

u(0) --> [].

u(X) --> [0], u(X).

u(s(X)) --> [1], u(X)

v(0) --> [].

v(X) --> [1], v(X).

v(s(X)) --> [0], v(X).

C).

S(A,D) :- u(X,A,B),

u(X,B,[2|C]),

v(X,C,D).

u(0,A,A).

u(X,[0|A],B) :- u(X,A,B).

u(s(X),[1|A],B) :- u(X,A,B).

v(0,A,A).

v(X,[1|A],B) :- v(X,A,B).

v(s(X),[0|A],B) :- v(X,A,B).

D).

mkList(0,[]).

mkList(N,[N|L]) :- integer(N), N>0, M is N-1, mkList(M,L).

s(X) --> Y is X+X, t(Y).

t(0) --> [].

t(Sum) --> {mkList(Sum,Sumlist), member(X,SumList)}, [X], {NewSum is Sum-X}, t(NewSum).

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Q1 (a)

i, ii facts

iii rule

iii best as it allows you to query lamb and white independently.

(B).

i. no.

ii. X = 3+2

iii. no.

iv. instanciation error.

v. X = 5.

vi. no.

vii. yes.

viii. yes.

(C).

split(\_,[],[],[]).

split(N,[H|T],[H|Small],Big) :- H < N, split(N,T,Small,Big).

split(N,[H|T],Small,[H|Big]) :- N =< H, split(N,T,Small,Big).

(D).

sumOfPowers(N,S) :- sop(N,0,S).

sop(0,S,S).

sop(N,Ac,S) :- N>1, N1 is N-1,

power(N,N,PN),

NAc is Ac + PN,

sop(N1,NAc,S).

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Q2 (B) Red.

(C).

last(X,[X])

last(X,[\_|[H|T]]) :- last(X,[H|T]).

(D).

multiple(X,[X|L]) :- member(X,L).

multiple(X,[\_|L]) :- multiple(X,L).

(E).

next(A,B,[A,B|\_]).

next(A,B,[\_|T]) :- next(A,B,T).