vars(V,[V]):- atom(V).

vars(non(V),S):- vars(V,S).

vars(si(X,Y),S):- vars(X,A),vars(Y,B), union(A,B,S).

vars(sau(X,Y),S):- vars(X,A),vars(Y,B), union(A,B,S).

vars(imp(X,Y),S) :-vars(X,A),vars(Y,B), union(A,B,S).

val(V,[(V,A)|\_],A).

val(V,[\_|T],A) :- val(V,T,A).

bnon(X,0):- X is 1.

bnon(X,1):- X is 0.

bsi(A,B,1):- A is 1, B is 1.

bsi(A,\_,0):- bnon(A,C), C is 1.

bsi(\_,A,0):- bnon(A,C), C is 1.

bsau(A,B,0):- A is 0, B is 0.

bsau(A,\_,1):- A is 1.

bsau(\_,A,1):- A is 1.

bimp(A,B,1):- bnon(A,C), bsau(C,B,D), D is 1.

bimp(A,B,0):- A is 1, B is 0.

eval(V,E,A) :- atom(V), val(V,E,A).

eval(non(X),E,A) :- eval(X,E,B), bnon(B,A).

eval(si(X,Y),E,A) :- eval(X,E,B), eval(Y,E,C), bsi(B,C,A).

eval(sau(X,Y),E,A) :- eval(X,E,B), eval(Y,E,C), bsau(B,C,A).

eval(imp(X,Y),E,A) :- eval(X,E,B), eval(Y,E,C), bimp(B,C,A).

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

evals(V,[H|T],[A|B]):- eval(V,H,A), evals(V,T,B).

evs([],[[]]).

evs([V|T],Es) :- evs(T,Esp), adauga(V,Esp,Es).

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

adauga(V,[E|T], [[(V,0)|E],[(V,1)|E]|Es]) :- adauga(V,T,Es).

all\_evals(X,As) :- vars(X,S), evs(S,Es), evals(X,Es,As).

taut(V):- all\_evals(V,L),all\_one(L).

all\_one([1]).

all\_one([1|T]):- all\_one(T).