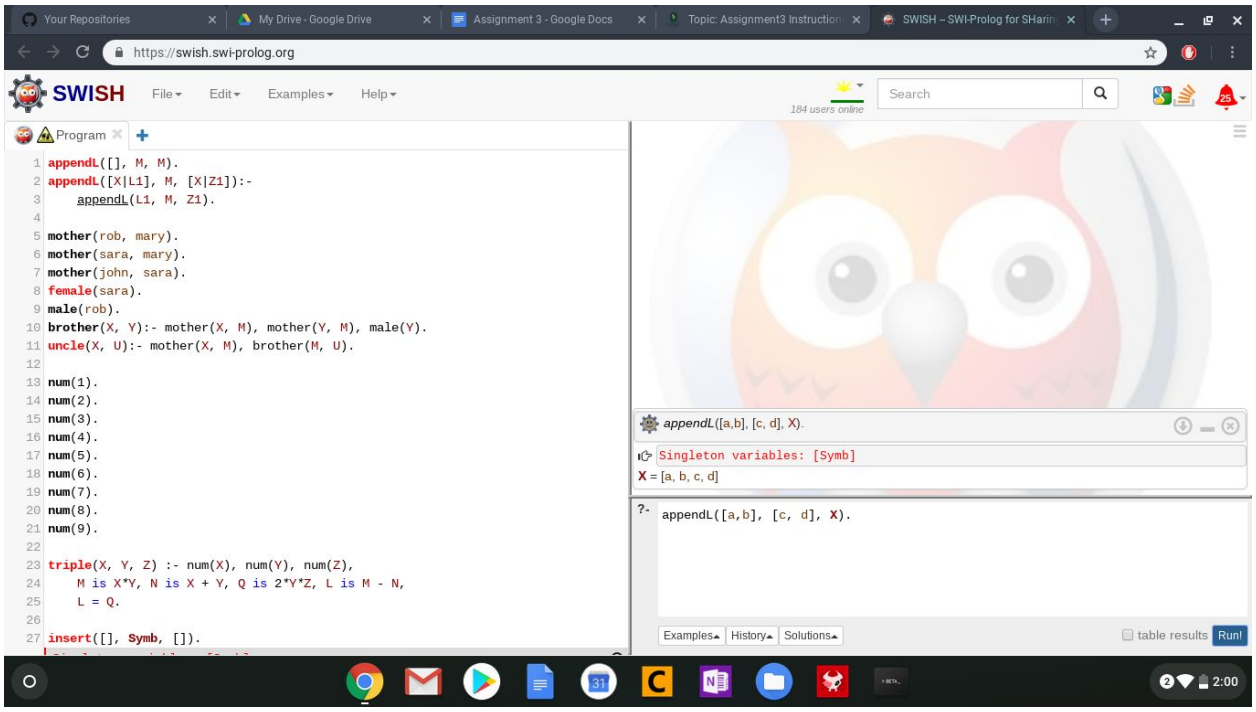
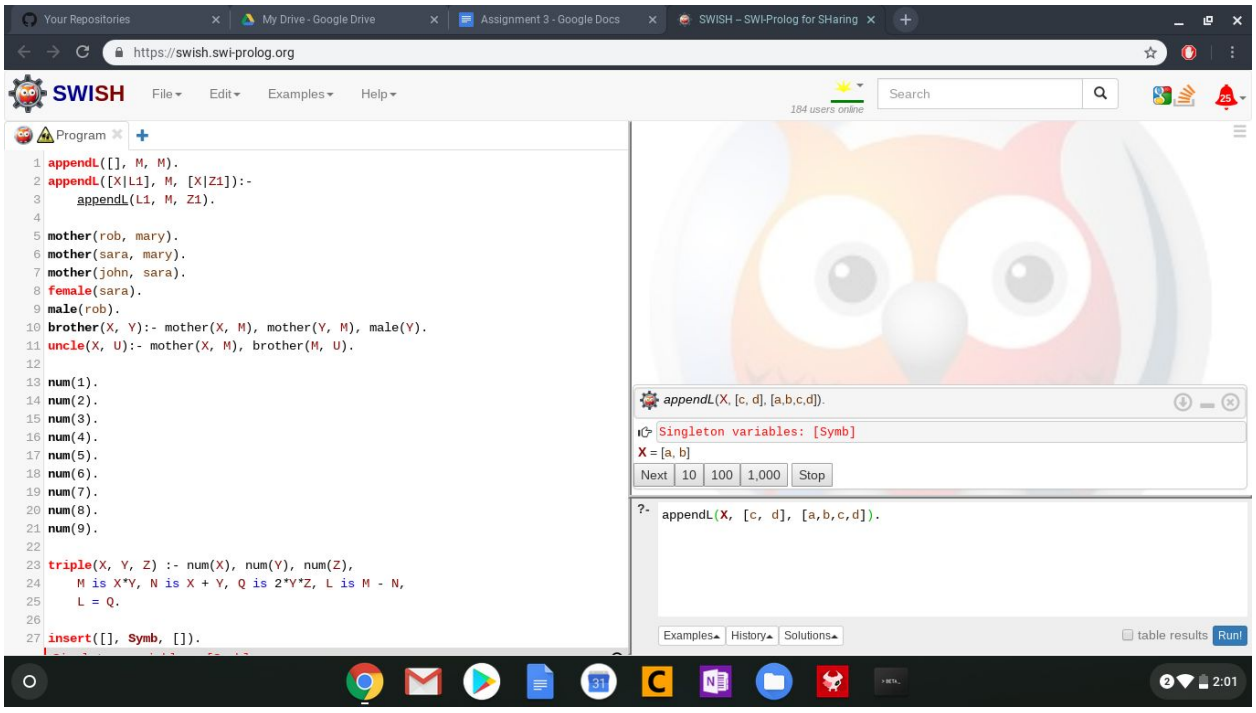
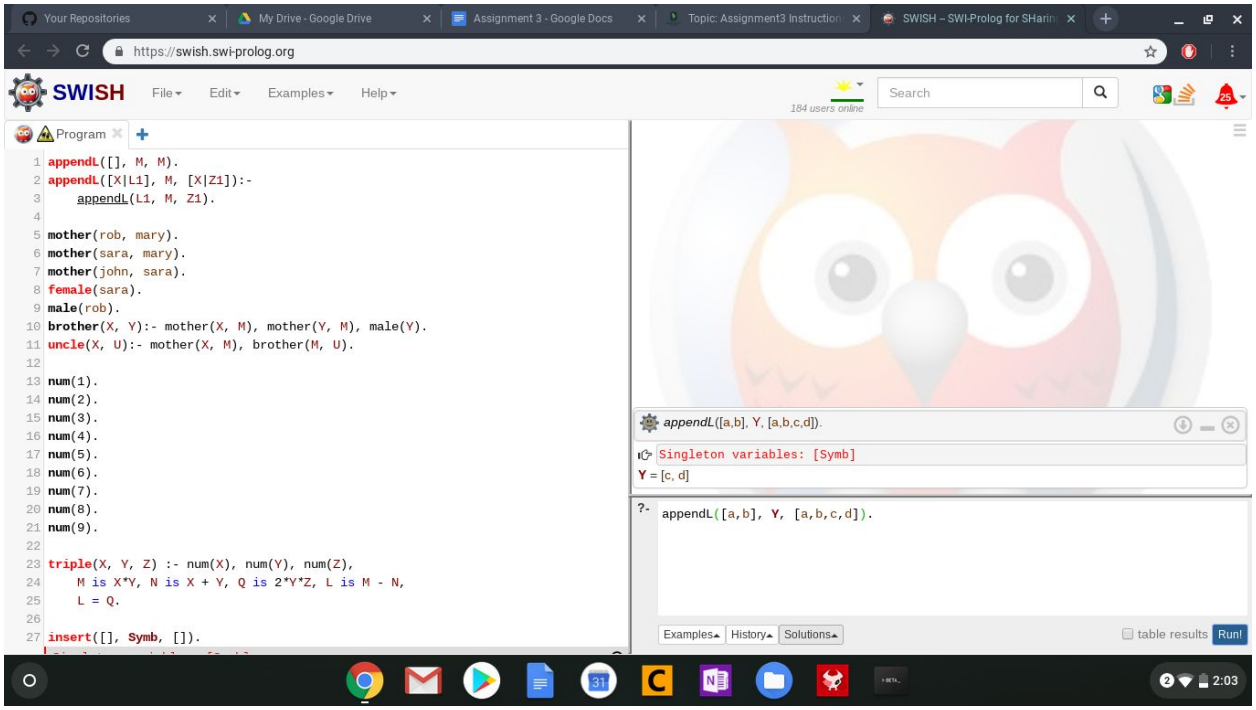
Pawan Chandra
Pawan Khatri

Assignment 3: Prolog



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Program
1 appendL([], M, M).
2 appendL([X|L1], M, [X|Z1]):-
3 appendL(L1, M, Z1).
4
5 mother(rob, mary).
6 mother(sara, mary).
7 mother(john, sara).
8 female(sara).
9 male(rob).
10 brother(X, Y):- mother(X, M), mother(Y, M), male(Y).
11 uncle(X, U):- mother(X, M), brother(M, U).
12
13 num(1).
14 num(2).
15 num(3).
16 num(4).
17 num(5).
18 num(6).
19 num(7).
20 num(8).
21 num(9).
22
23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
appendL([a,b], Y, [a,b,c,d]).
Singleton variables: [Symb]
Y = [c, d]
?- appendL([a,b], Y, [a,b,c,d]).
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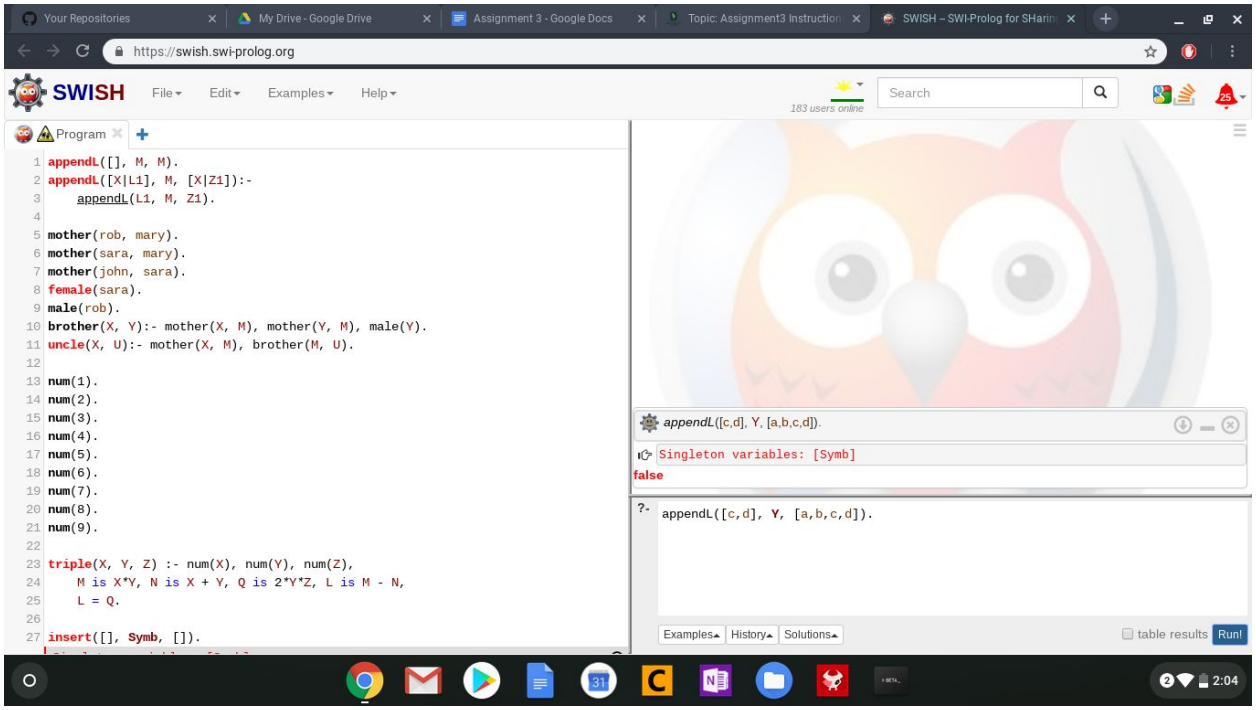
2:03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3 appendL(L1, M, Z1).
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22
23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
appendL([c,d], Y, [a,b,c,d]).
Singleton variables: [Symb]
false
?- appendL([c,d], Y, [a,b,c,d]).
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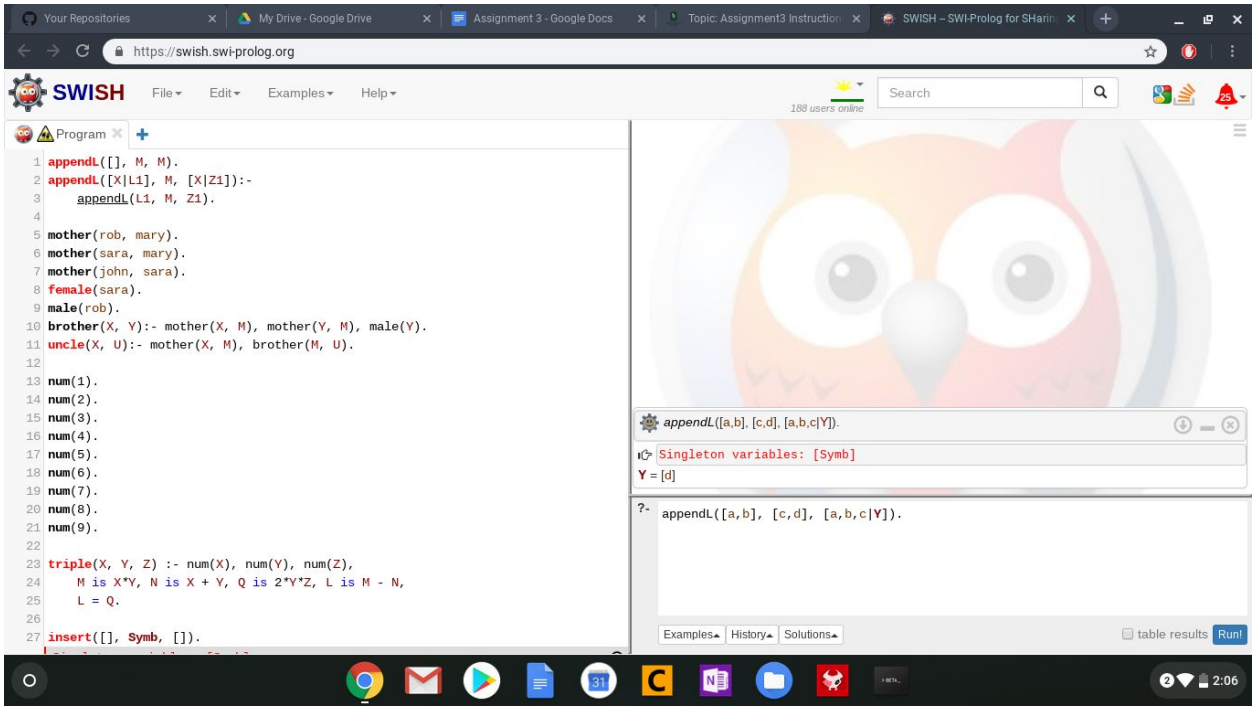
Run!
2:04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2 appendL([X|L1], M, [X|Z1]):-
3 appendL(L1, M, Z1).
4
5 mother(rob, mary).
6 mother(sara, mary).
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13 num(1).
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23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
appendL([a,b], [c,d], [a,b,c|Y]).
Singleton variables: [Symb]
Y = [d]
?- appendL([a,b], [c,d], [a,b,c|Y]).
Examples
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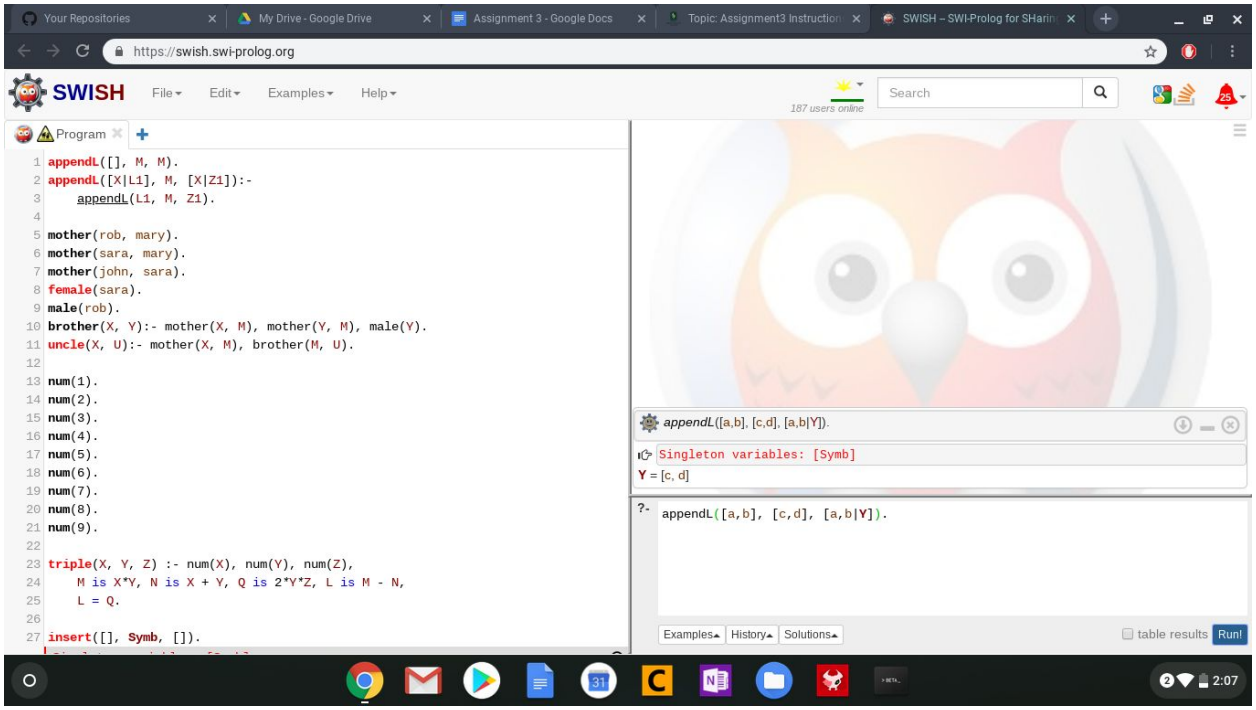
Run!
2:06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25 L = Q.
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27 insert([], Symb, []).
appendL([a,b], [c,d], [a,b|Y]).
Singleton variables: [Symb]
Y = [c, d]
?- appendL([a,b], [c,d], [a,b|Y]).
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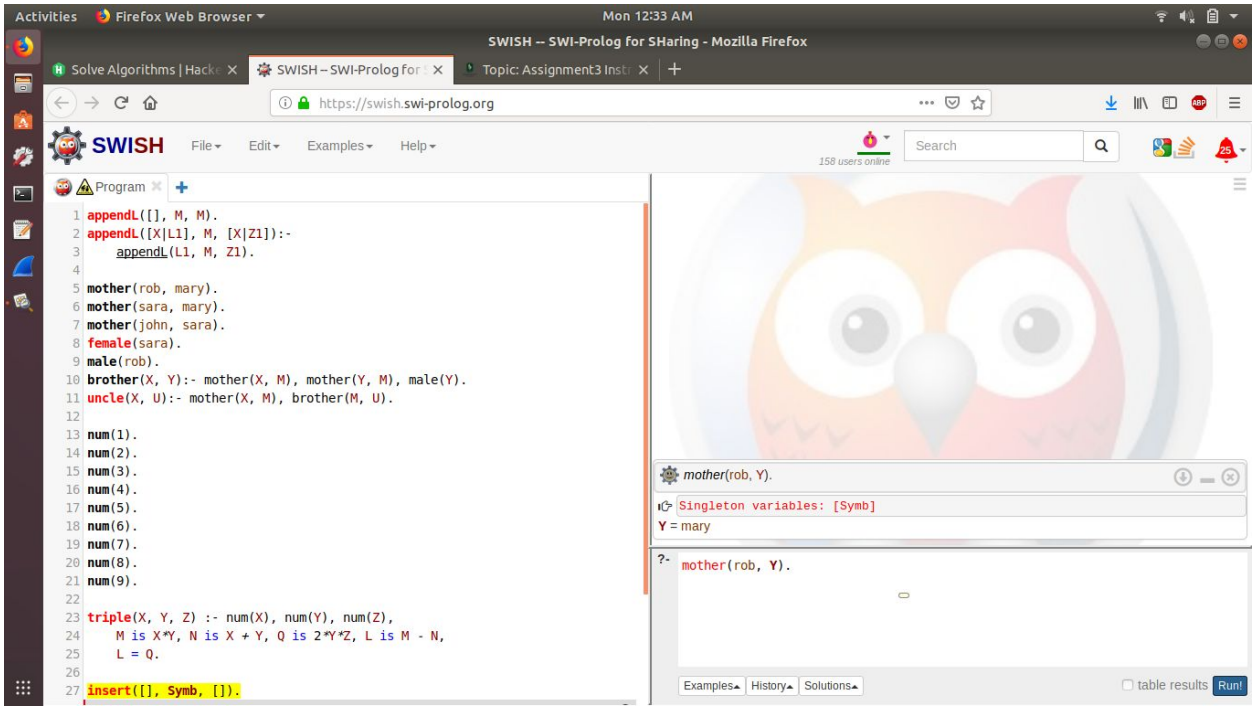
2:07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24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
mother(rob, Y).
Singleton variables: [Symb]
Y = mary
?-
mother(rob, Y).
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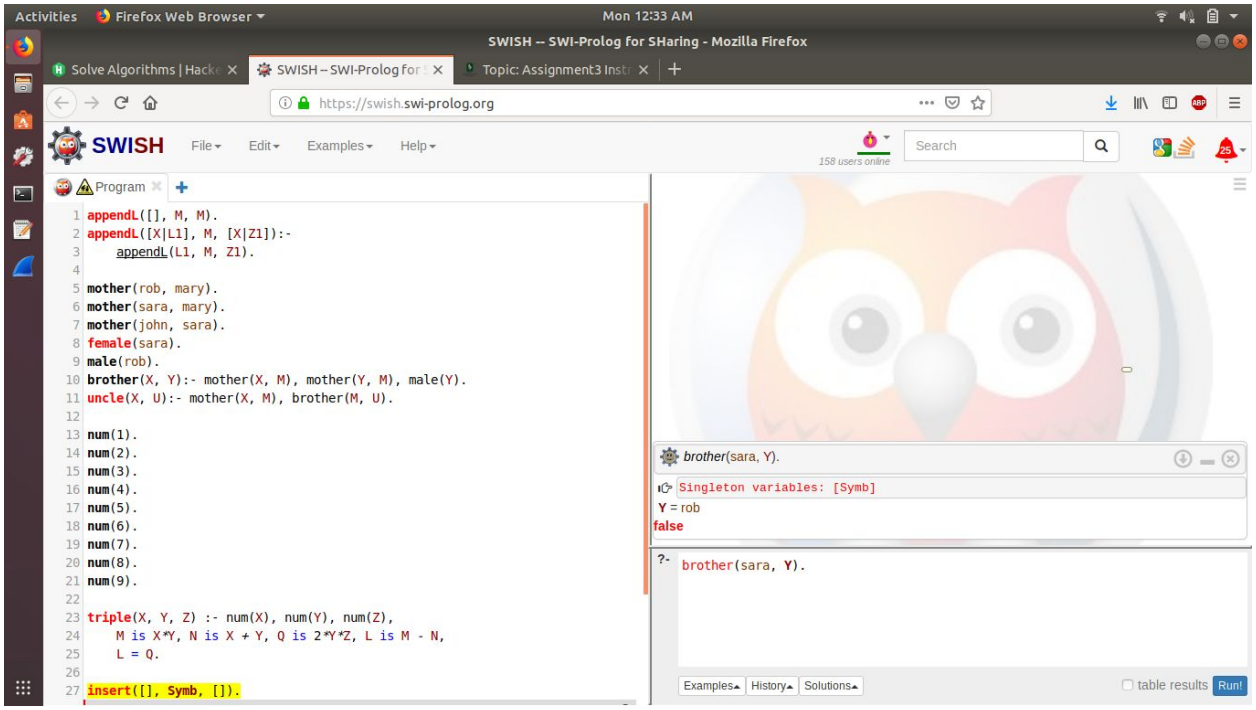
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24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
brother(sara, Y).
Singleton variables: [Symb]
Y = rob
false
?-
brother(sara, Y).
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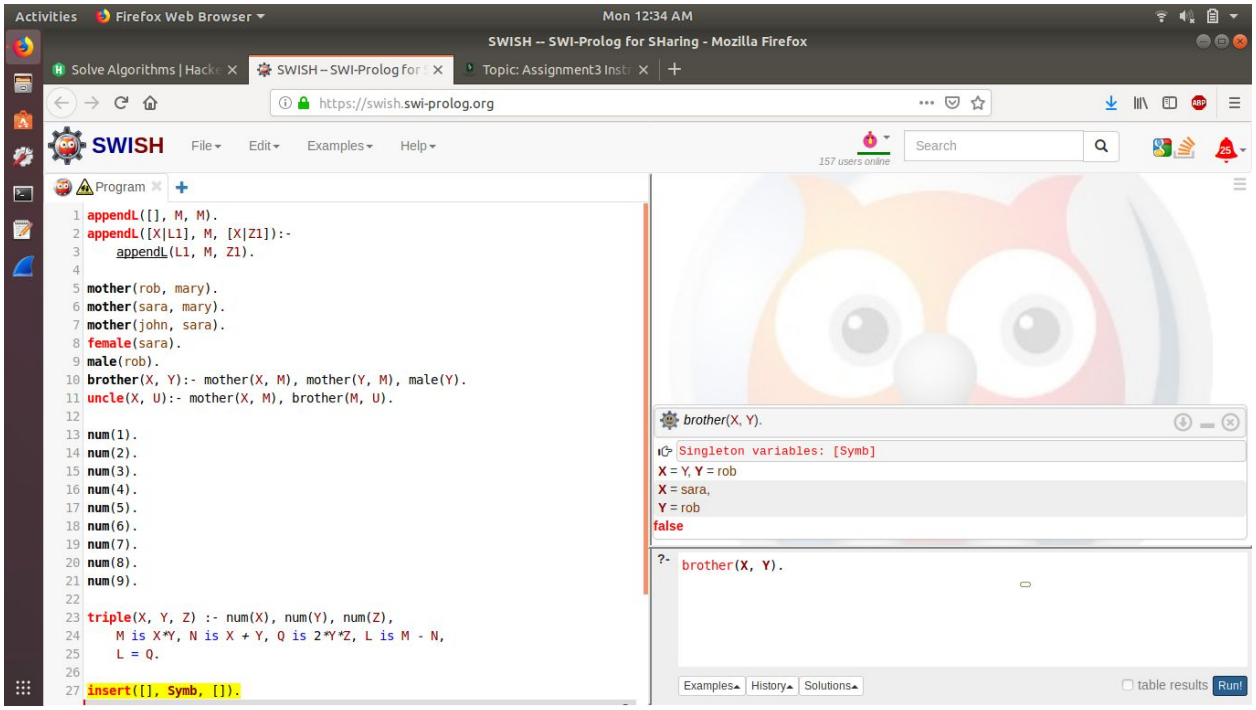
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24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
brother(X, Y).
Singleton variables: [Symb]
X = Y, Y = rob
X = sara,
Y = rob
false
?-
brother(X, Y).
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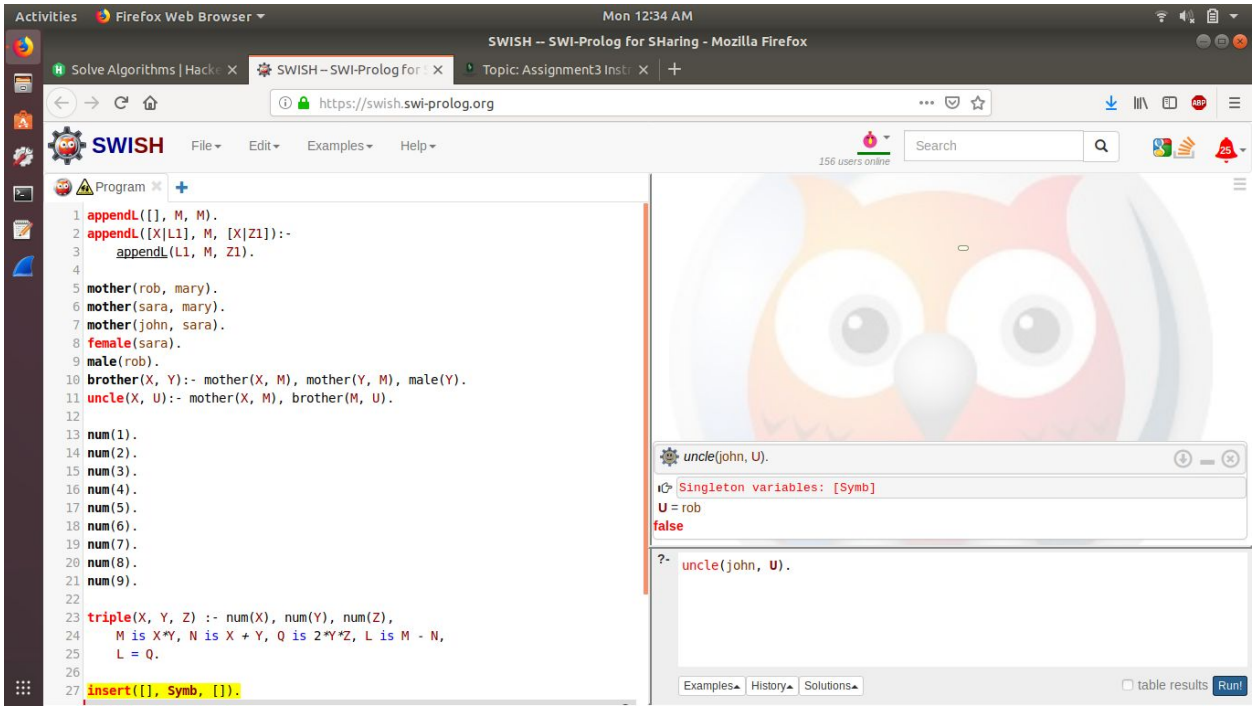
Run!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23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
uncle(john, U).
Singleton variables: [Symb]
U = rob
false
?-
uncle(john, U).
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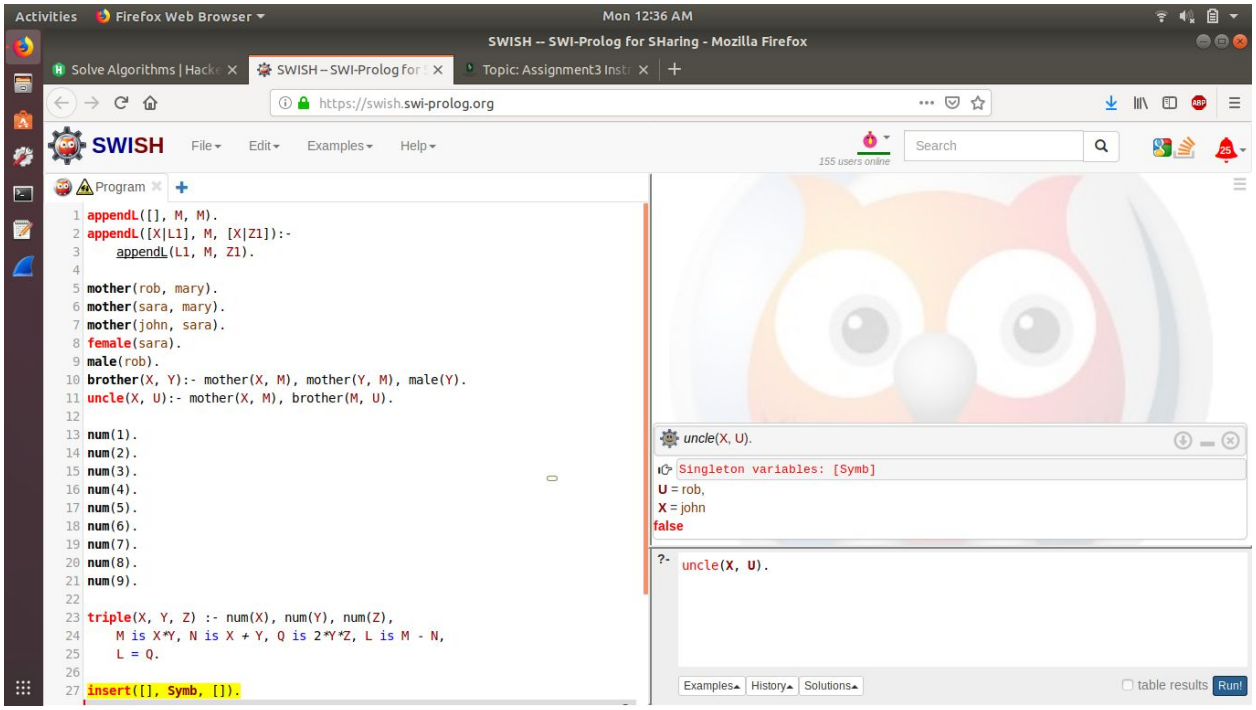
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Program
1 appendL([], M, M).
2 appendL([X|L1], M, [X|Z1]):-
3 appendL(L1, M, Z1).
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5 mother(rob, mary).
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25 L = Q.
26
27 insert([], Symb, []).
uncle(X, U).
Singleton variables: [Symb]
U = rob,
X = john
false
?- uncle(X, U).
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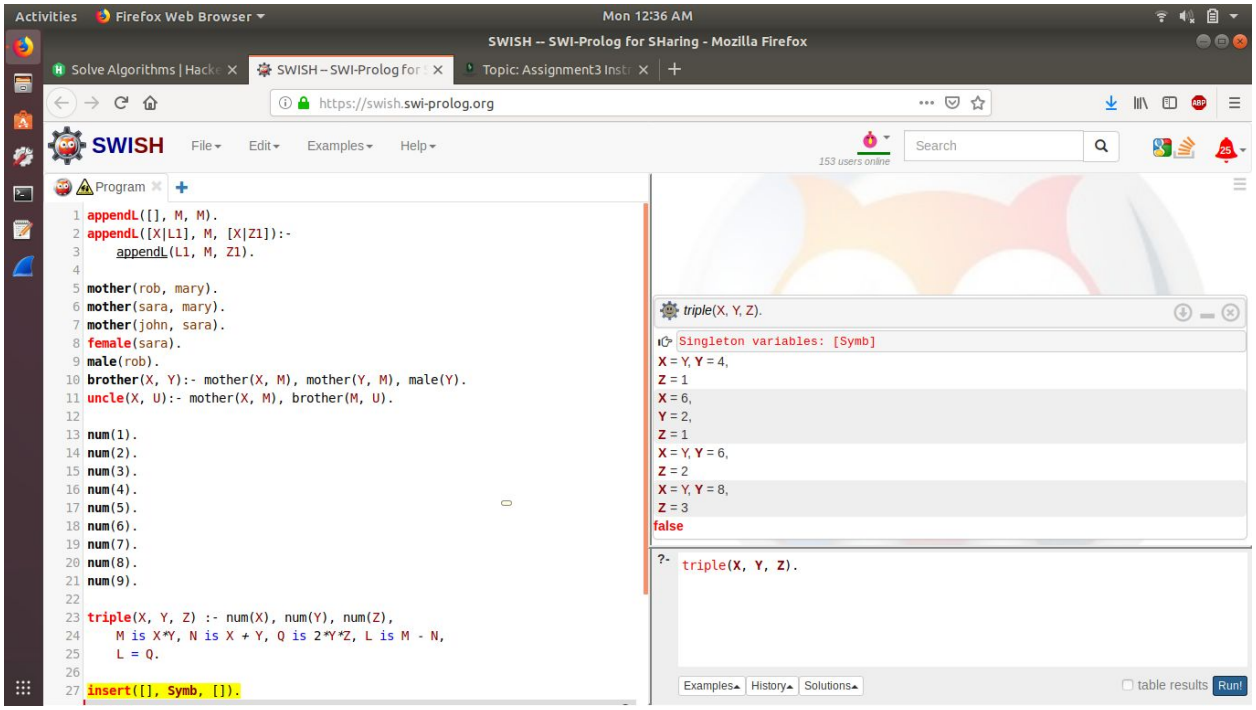
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23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
triple(X, Y, Z).
Singleton variables: [Symb]
X = Y, Y = 4,
Z = 1
X = 6,
Y = 2,
Z = 1
X = Y, Y = 6,
Z = 2
X = Y, Y = 8,
Z = 3
false
?- triple(X, Y, Z).
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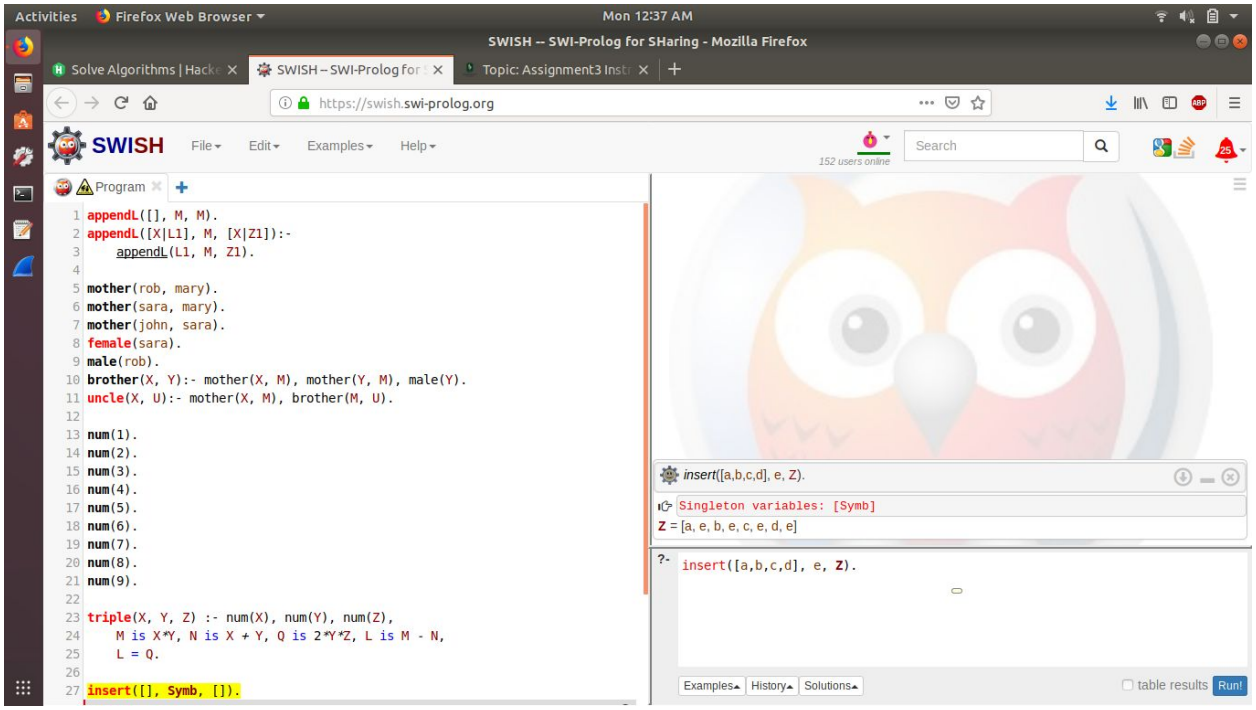
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23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
insert([a,b,c,d], e, Z).
Singleton variables: [Symb]
Z = [a, e, b, e, c, e, d, e]
?- insert([a,b,c,d], e, Z).
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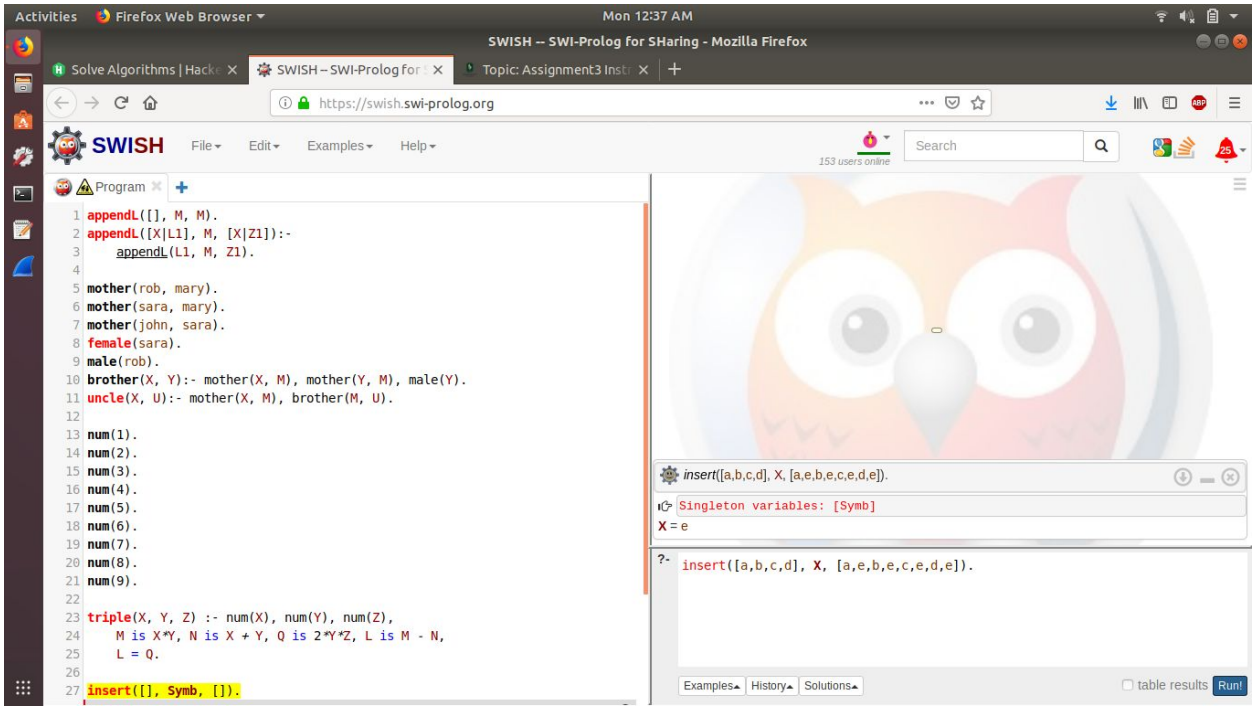
Run!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24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
insert([a,b,c,d], X, [a,e,b,e,c,e,d,e]).
Singleton variables: [Symb]
X = e
?- insert([a,b,c,d], X, [a,e,b,e,c,e,d,e]).
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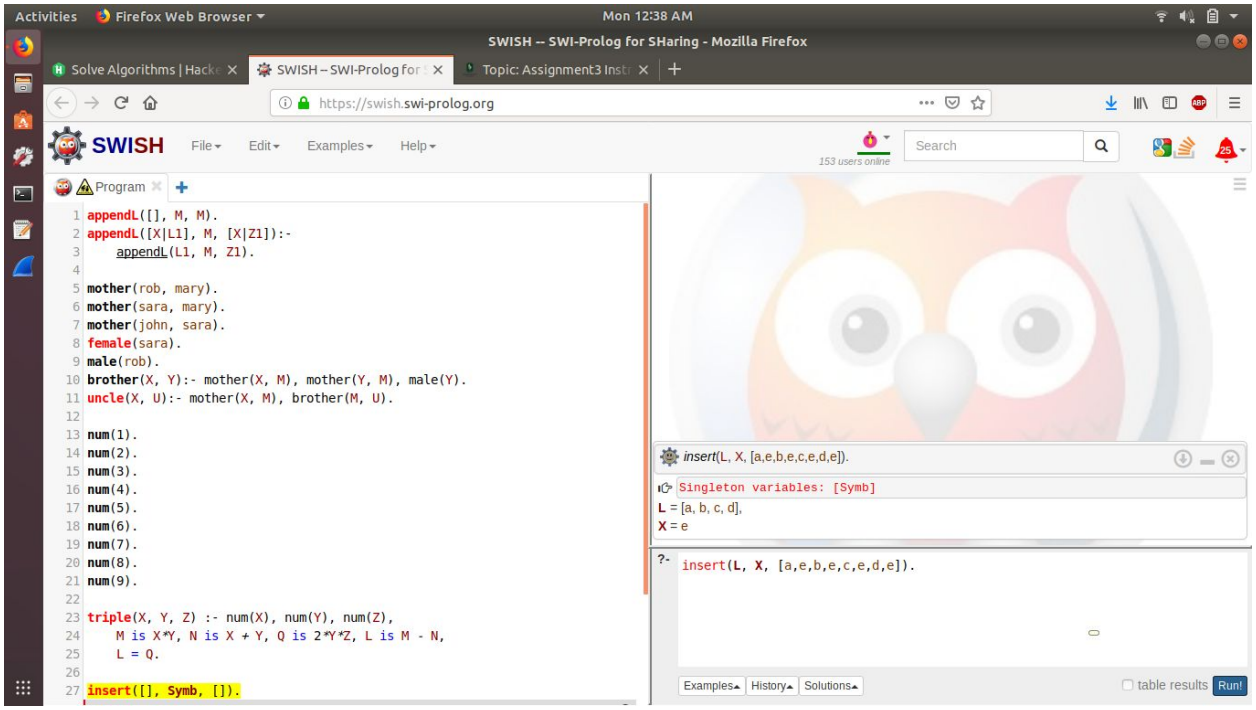
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25 L = Q.
26
27 insert([], Symb, []).
insert(L, X, [a,e,b,e,c,e,d,e]).
Singleton variables: [Symb]
L = [a, b, c, d],
X = e
?-
insert(L, X, [a,e,b,e,c,e,d,e]).
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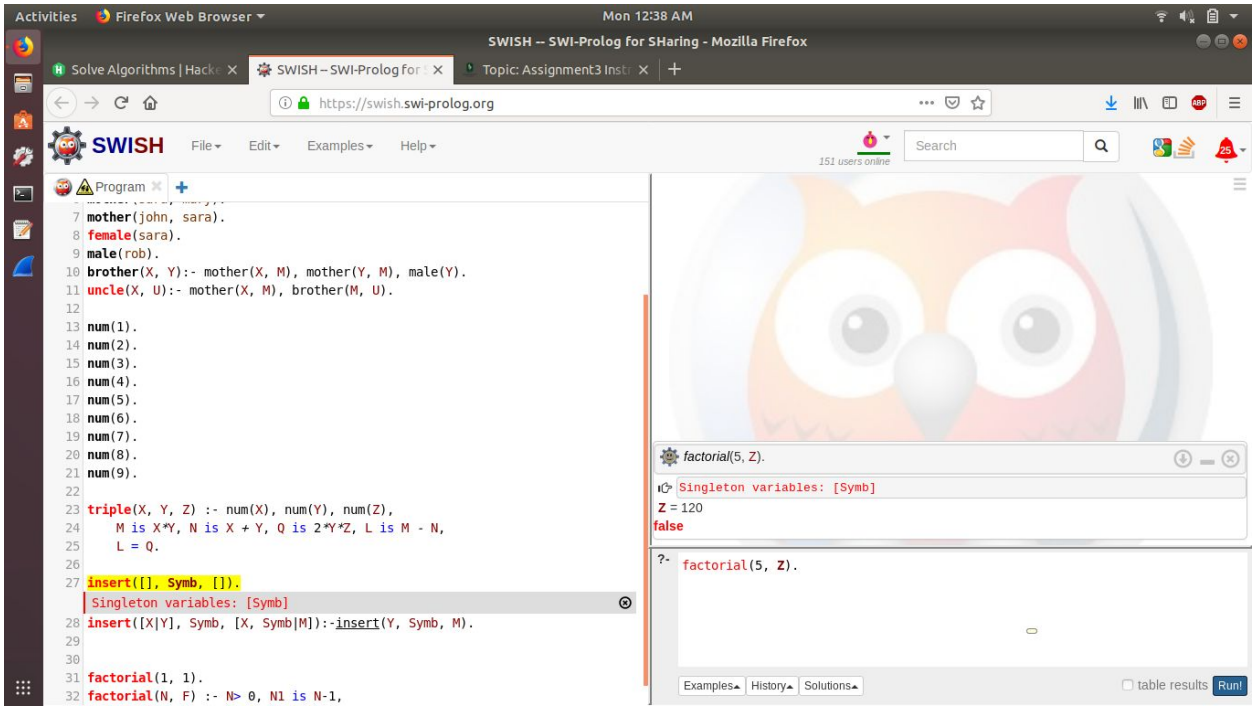
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7 mother(john, sara).
8 female(sara).
9 male(rob).
10 brother(X, Y):- mother(X, M), mother(Y, M), male(Y).
11 uncle(X, U):- mother(X, M), brother(M, U).
12
13 num(1).
14 num(2).
15 num(3).
16 num(4).
17 num(5).
18 num(6).
19 num(7).
20 num(8).
21 num(9).
22
23 triple(X, Y, Z) :- num(X), num(Y), num(Z),
24 M is X*Y, N is X + Y, Q is 2*Y*Z, L is M - N,
25 L = Q.
26
27 insert([], Symb, []).
Singleton variables: [Symb]
28 insert([X|Y], Symb, [X, Symb|M]):-insert(Y, Symb, M).
29
30
31 factorial(1, 1).
32 factorial(N, F) :- N> 0, N1 is N-1,
factorial(5, Z).
Singleton variables: [Symb]
Z = 120
false
?- factorial(5, Z).
Examples
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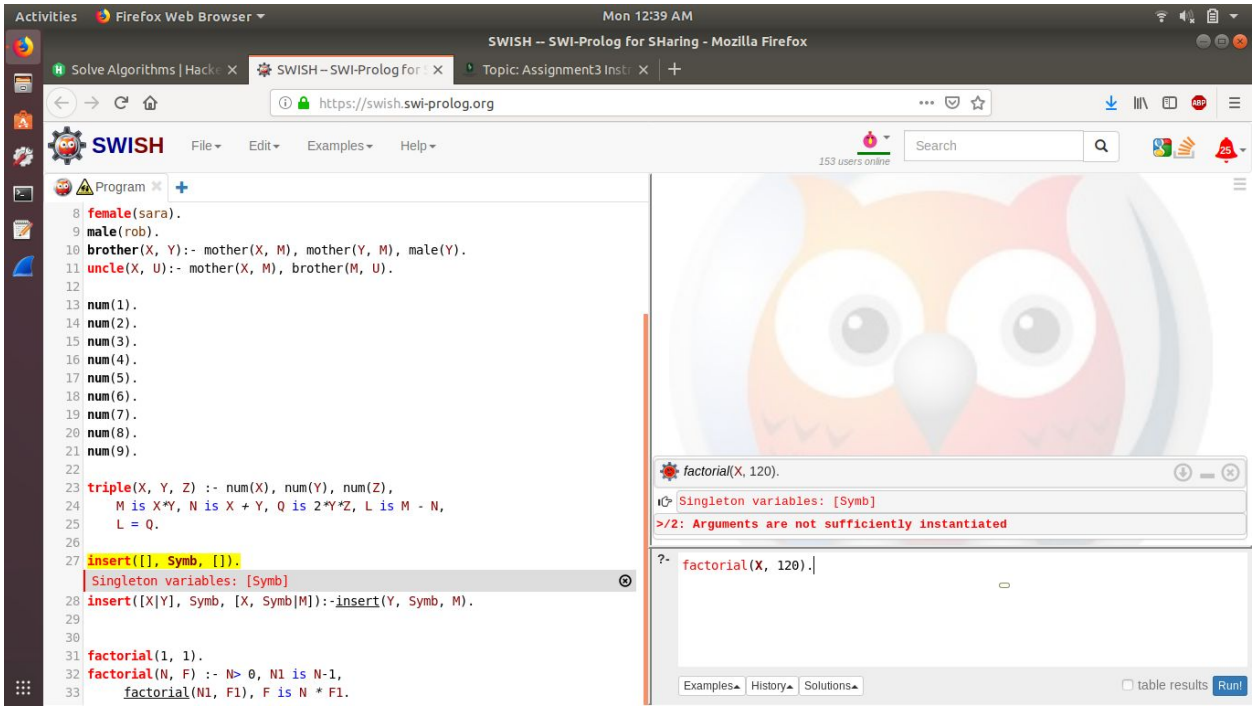
Solutions
table results
Run!


Activities
Firefox Web Browser
Mon 12:39 AM
SWISH -- SWI-Prolog for SHaring - Mozilla Firefox
Solve Algorithms | Hacke
SWISH – SWI-Prolog for
Topic: Assignment3 Instr
https://swish.swi-prolog.org
SWISH
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Program
8 female(sara).
9 male(rob).
10 brother(X, Y):- mother(X, M), mother(Y, M), male(Y).
11 uncle(X, U):- mother(X, M), brother(M, U).
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27 insert([], Symb, []).
Singleton variables: [Symb]
28 insert([X|Y], Symb, [X, Symb|M]):-insert(Y, Symb, M).
29
30
31 factorial(1, 1).
32 factorial(N, F) :- N> 0, N1 is N-1,
33 factorial(N1, F1), F is N * F1.
factorial(X, 120).
Singleton variables: [Symb]
>/2: Arguments are not sufficiently instantiated
?- factorial(X, 120).
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Questions: 1 - 6

1.Test all queries one query at a time. Take a screenshot for all results. Submit the screen shots and the answers in a PDF document for the following remaining steps.

See the images above

2.State how many solutions you got for the "triple predicate" query also.

There are 3 Solutions for the triple predicate

3.Also report what happens when you call factorial(X, 120).

There is an error stating, “Arguments are not sufficiently instantiated”. The error is due to n being a variable in the given query when the parameter of the function is looking for an integer type.

4. In two lines explain how backtracking works for the triple query.

When a subgoal cannot be satisfied, Prolog starts the process of backtracking. It goes back to the previous subgoal, undoes any variable bindings that took place at this point, and tries to re-satisfy this subgoal. It does so by attempting to match against the head of the next clause in the program database after the clause that last resulted in a match.

5. Explain the logic for the insert predicate.

Insert predicate compares the value of the item to inserted with the head of the list. If its less than this value, then the new item must be inserted just before this head, otherwise the item is inserted into the new tail

6. Explain how the brother predicate works.

Brother predicate finds out if a brother has a sibling for example, borther (B, S) = B is a brother of S if B has a parent X, and X is a parent of S