Exercises Nov. 11 (S1) and Nov. 12 (S2)

1. ADAPTED FROM JUNE 2006, 3A
   For the PROLOG program below, state all results (all instantiations of X and Y)
   which will be produced by repeated satisfaction of the goal t(X,Y) (as obtained by
   the repeated use of ;).

   ```
   t(X,Y):-s(X), !, v(Y), u(Y).
   v(a).
   v(b).
   v(c).
   u(b).
   u(c).
   s(1).
   s(2).
   ```

2. ADAPTED FROM JUNE 2004, 4A
   Define a predicate palin(A) that is true if and only if the list A is a palindrome, i.e.,
   the same when read left to right and right to left. Show the sequence of subgoals
   during (successful) satisfation of the goal palin([1,2,1]).

3. ADAPTED FROM JANUARY 2001, 2B
   Given the PROLOG program

   ```
   p(a).
   p(b) :- q(X), p(X).
   p(c) :- q(c), !, p(_).
   q(c).
   ```

   what will the interpreter gprolog answer to each of the following two questions,
   assuming we repeatedly reply with ;?

   ```
   ?- q(X), p(X).
   ?- q(c), !, p(X).
   ```

4. ADAPTED FROM JANUARY 2000, 1B
   Consider the following PROLOG program:

   ```
   p(1).
   p(2) :- !.
   p(3).
   ```

   For each of the following queries, find all the answers produced by PROLOG (by
   repeated use of ;).

```
?- p(X).
?- p(X), p(Y).
?- p(X), !, p(Y).
```

5. ADAPTED FROM JANUARY 2001, 1A-C
   Given the following PROLOG rule:

   ```
   myst([H|T] - [H|S], T - S).
   ```

   how does the interpreter answer each of the following questions:

   ```
   ?- myst([1,2,3,4] - [1,2], X).
   ?- myst([1,2,3,4] - [1,2], X), myst(X,Y).
   ?- myst(X - Y, [1,2] - Z).
   ```

   Hint: it makes no difference if - *is changed to* + *or one of many other symbols.*

6. ADAPTED FROM JUNE 2003, 4B
   Find a most general unifier (using the unification algorithm described in the lecture) of each of the following pairs of predicates, if such a unifier exists.

   $f(X, Y)$ and $f(g(Y), h(Z))$

   $f(X, X)$ and $f(Y, g(Y))$

   $p(X, g(X), h(Y))$ and $p(g(Y), Z, h(a))$