CSE 341 — Additional CLP($\mathcal{R}$) Discussion Questions

These questions use the following CLP($\mathcal{R}$) rules:

```
member(X,[X|Xs]).
member(X,[Y|Ys]) :- member(X,Ys).

member_cut(X,[X|Xs]) :- !.
member_cut(X,[Y|Ys]) :- member(X,Ys).

length([],0).
length([_|Xs],N) :- N>0, length(Xs,N-1).
```

1. What are all the answers that CLP($\mathcal{R}$) returns for the following goals? (If there are an infinite number give the first several; if there are none, say so.)

   ```
   member(squid,[clam,squid,tuna])
   ```

   ```
   member(squid,X)
   ```

   ```
   member_cut(squid,[clam,squid,tuna])
   ```

   ```
   member_cut(squid,X)
   ```

   ```
   member(X,[a,b,c,d]), member(X,[c,d,e,f])
   ```

   ```
   length([A,B,C],N)
   ```

   ```
   length([A,B,C|Cs],N)
   ```

2. Write a CLP($\mathcal{R}$) rule to find the average of a list of numbers. Fail if the list is empty.

3. Write a CLP($\mathcal{R}$) rule `range(Lo,Hi,List)` that succeeds if `List` consists of all the numbers between `Lo` and `Hi` inclusive. (Assume that `Lo` and `Hi` are integers.) If `Lo` is greater than `Hi`, `List` should be empty.

4. Given your `range` rule from Question 3, what are all the results for the following goals?

   ```
   range(2,5,A)
   range(5,2,A)
   range(A,B,[2,3,4,5,6])
   range(A,B,[2,4,6])
   ```

5. Write another version of `range` that also takes a `Step` parameter: `range(Lo,Hi,Step,List)`. `Lo`, `Hi`, and `Step` don't have to be integers for this version. For example, `range(2.2, 3.0, 0.2, L)` should succeed with `L = [2.2,2.4,2.8,3.0]`.

6. Is CLP($\mathcal{R}$) statically typed? Is it type safe?

7. Compare the way parameters are passed in Miranda and CLP($\mathcal{R}$).