

CSE 341 — Prolog Discussion Questions

Difference Lists; Controlling Search

These questions use the Prolog rules in the lecture notes (both the basics and the ones on controlling search).

1. Write the list `[squid, clam]` as a difference list (in the most general possible way). Also draw a box-and-arrow diagram of the difference list.
2. Consider `mymember` and also the `member_cut` rule defined in the notes on controlling search. What are all the answers that Prolog returns for the following goals?

?- `mymember(1, [A, B, C])` .

?- `member_cut(1, [A, B, C])` .

3. What are all the answers that Prolog returns for the following goals?

?- `mymember(X, [1, 2]), mymember(X, [0, 2, 2])` .

?- `member_cut(X, [1, 2]), mymember(X, [0, 2, 2])` .

?- `mymember(X, [1, 2]), member_cut(X, [0, 2, 2])` .

?- `member_cut(X, [1, 2]), member_cut(X, [0, 2, 2])` .

4. What are all the answers that Prolog returns for the following goals?

?- `not(mymember(1, [1, 2, 3]))` .

?- `not(mymember(5, [1, 2, 3]))` .

?- `not(mymember(X, [1, 2, 3]))` .

?- `mymember(X, [1, 2, 3]), not(mymember(X, [1, 2, 4]))` .

?- `not(mymember(X, [1, 2, 4])), mymember(X, [1, 2, 3])` .

5. Consider the standard version of `append`:

```
append([], Ys, Ys) .
```

```
append([X|Xs], Ys, [X|Zs]) :- append(Xs, Ys, Zs) .
```

If you know that the first argument is ground (that is, fully instantiated, containing no variables), there is a more efficient version that you can write by including a cut.

- (a) Define such a version.
- (b) Give an example of a query that has exactly the same behavior for both the standard version and the version with a cut.
- (c) Give an example of a query that behaves differently for for the standard version and the version with a cut.
- (d) What restrictions do we need on the inputs for the two versions to behave exactly the same? (Is it that the first argument is ground?)