CSCE 330 Spring 2004

Take-Home Final Exam

April 27, 2004

This exam must be returned in the departmental dropbox before coming to class at the time scheduled for the final exam (Monday, May 3, 2pm), when student presentations will take place. You must present and attend your fellow students' presentations. You may use only your textbooks and notes for this assignment. The work you submit must be your individual work. In particular, do not discuss your work with anyone else and do not search anywhere (including the web) for a solution.

Submit the programs with an example of use (e.g., a script, if you are using Unix).

Do exercise 5.4.2 in Ullman's textbook.

(Clocksin and Mellish) Suppose someone has already written Prolog clauses that define the following relationships:

```
father(X,Y)             /* X is the father of Y */
mother(X,Y)             /* X is the mother of Y */
male(X)                 /* X is male */
female(X)               /* X is female */
parent(X,Y)             /* X is a parent of Y */
diff(X,Y)               /* X and Y are different */
```

The problem is to write Prolog clauses that define the following relationships:

```
is_mother(X)            /* X is a mother */
is_father(X)            /* X is a father */
is_son(X)               /* X is a son */
sister_of(X,Y)          /* X is a sister of Y */
granpa_of(X,Y)          /* X is a grandfather of Y */
sibling(X,Y)            /* X is a sibling of Y */
```

For example, we could write a rule for `aunt`, provided we were supplied with (or wrote) rules for `female`, `sibling`, and `parent`:

```
aunt(X,Y) :- female(X), sibling(X,Z), parent(Z,Y).
```

This could also be written:

```
aunt(X,Y) :- sister_of(X,Z), parent(Z,Y).
```

provided that we wrote the `sister_of` rule.