CSE 571 Fall 2015
Project 2: Constraint Satisfaction Problems

Due: October 19, 10:00PM

The homework should be submitted to SafeAssignment on the blackboard. The file should be named project2-[your firstname]-[your lastname].doc[x] (or pdf). Scanned documents are not allowed except for pictures.

Use CLINGO to solve the following problems. For each problem, show the input program, the command line, and the output. Put everything in one document.

Problem 1 You are organizing a party. There will be n tables in the room, with m chairs around each table. You need to select a table for each of the guests, who are assigned numbers from 1 to mn, so that two conditions are satisfied. First, some guests like each other and want to sit together; accordingly, you are given a set A of two-element subsets of $\{1, \ldots, mn\}$, and, for every $\{i, j\}$ in A, guests i and j should be assigned the same table. Second, some guests dislike each other and want to sit at different tables; accordingly, you are given a set B of two-element subsets of $\{1, \ldots, mn\}$, and, for every $\{i, j\}$ in B, guests i and j should be assigned different tables. Problem: find such a seating arrangement or determine that this is impossible. Test with one example that has an arrangement, and another example that has not. Be sure the following test cases work as expected, and also provide your own different test cases. Assume that `like` and `dislike` are symmetric relations.

```
% problem 1 test case 1

#const n=3.
#const m=3.


like(1,9).
like(2,8).
like(3,7).
like(7,6).
like(8,4).

dislike(1,7).
dislike(1,8).
dislike(7,8).

% this test case should return
% a satisfying seating assignment
```

```
% problem 1 test case 2

#const n=3.
#const m=4.

like(1,2).
like(1,4).
like(2,5).
like(10,5).
like(6,7).
like(5,7).

dislike(2,3).
dislike(4,6).
dislike(1,8).
dislike(8,9).

% this test case should not return
% a satisfying seating assignment
```

Problem 2 Each of four men owns a different species of exotic pet. Here is what we know about them:

1. Mr Engels (whose pet is named Sparky), Abner and Mr. Foster all belong to a club for owners of unusual pets.
2. The iguana isn't owned by either Chuck or Duane.
3. Neither the jackal nor the king cobra is owned by Mr. Foster.
4. The llama doesn't belong to Duane (whose pet is named Waggles).
5. Abner, who doesn't own the king cobra, isn't Mr. Gunter.
6. Bruce and Mr. Foster are neighbors.
7. Mr. Halevy is afraid of iguanas.

Problem: Find each man's full name and determine what kind of pet he owns. The command should instruct CLINGO to find all answer sets (e.g., put 0 at the end).

Bonus Credit Problem Cover an 8×8 chessboard by twenty-one 3×1 tiles and one 1×1 tile. Include a picture that correspond to the first answer set returned.