Artificial Intelligence 625 Project2

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This report includes demo examples of 9 problems under my laptop 64-bit SWI-prolog (Windows 8.1). If there is anything compile problem please contact me, through **weichehsu76@tamu.edu**. Thanks.

Problem1: prob1.pl

```
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For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- make.
true.

?- brother(rod,X).
X = tod ;
false.

?- sister(marge,X).
X = patty ;
X = selma ;
false.

?- aunt(X,patty).
X = bart ;
X = lisa ;
X = maggie ;
false.

?- uncle(bart,X).
X = herb ;
false.

?- grandfather(maggie,X).
X = abraham ;
false.

?- granddaughter(jackie,lisa).
true.

?- ancestor(bart,X).
X = homer ;
X = marge ;
X = abraham ;
X = jackie.

?- unrelated(tod,bart).
true.

?- unrelated(maggie,smithers).
true.

?- unrelated(maggie,selma).
false.

?-
```
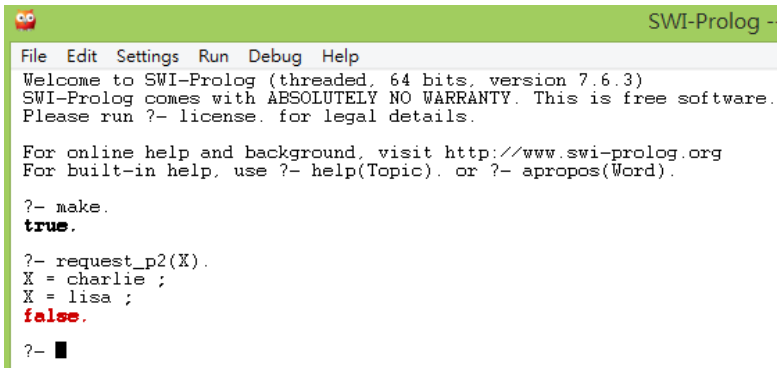

Problem2: prob2.pl

I answer the request of problem2 as the predicate, called **request_p2(X)**, in prob2.pl



Problem3: prob3.pl

```
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For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- make.
true.

?- remdups([1,3,4,2,4,3,6,8,6,5,4,2,3,4,9],X).
X = [1, 8, 6, 5, 2, 3, 4, 9] .

?-
```

Problem4: prob4.pl

```
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For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- make.
true.

?- factor(120,M).
M = [2, 2, 2, 3, 5] ;
false.

?- factor(7,P).
P = [7] ;
false.

?-
```

Problem5: prob5.pl

```
?- make.
true.

?- bitvec(3,K).
K = [0, 0, 0] ;
K = [0, 0, 1] ;
K = [0, 1, 0] ;
K = [0, 1, 1] ;
K = [1, 0, 0] ;
K = [1, 0, 1] ;
K = [1, 1, 0] ;
K = [1, 1, 1] ;
false.

?- code(5,2,X).
X = [0, 0, 0, 1, 1] ;
X = [0, 0, 1, 0, 1] ;
X = [0, 0, 1, 1, 0] ;
X = [0, 1, 0, 0, 1] ;
X = [0, 1, 0, 1, 0] ;
X = [0, 1, 1, 0, 0] ;
X = [1, 0, 0, 0, 1] ;
X = [1, 0, 0, 1, 0] ;
X = [1, 0, 1, 0, 0] ;
X = [1, 1, 0, 0, 0] ;
false.

?-
```

Problem6: **prob6.pl**

This program does not consider the case of sin→1 and cos→0 because this type case will update x point to very far place by Newton methods. Besides, I don't set digit precision to Y.

```
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Please run ?- license. for legal details.

For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- make.
true.

?- sin_zero(3,Y).
Y = 3.141592653300477 ;
false.

?- sin_zero(10,Y).
Y = 9.424777960768635 ;
false.

?-
```

Problem7: **prob7.pl**

For the question, M should be 1 (maximum value for two unique numbers: one digit + another digit = 9 + 8 = 17), so in the program M is 1 directly.

Use the query **sol_SendMoreMoney(S,E,N,D,M,O,R,Y).** to solve this problem.

```
?- make.
true.

?- sol_SendMoreMoney(S,E,N,D,M,O,R,Y).
S = 9,
E = 5,
N = 6,
D = 7,
M = 1,
O = 0,
R = 8,
Y = 2 ;
false.

?-
```

Problem8: **prob8.pl**

In this problem, I confirm with professor, the best moves only consider cases "directly win" or "block opponent's win". The priority of "directly win" is higher than that of "block opponent's win".

Row/Column Index order as the follow table:

	Column_1	Column_2	Column_3
Row_1			
Row_2			
Row_3			

If you want to change Facts of state description, you have to replace it in the prob8.pl, between line 4 and line 12.

The symbol of player only accepts **o** and **x**.

```
1   %prob8
2
3   % Attach facts for the configuration here:
4   p(x,1,1).
5   p(x,1,3).
6   p(o,3,1).
7   p(o,3,3).
8
9   %p(x,1,1).
10  %p(x,2,3).
11  %p(o,3,1).
12  %p(o,3,3).
13
14  p(b, R, C):- \+ p(x, R, C), \+ p(o, R, C).
15  validRow(X) :- member(X,[1,2,3]).
16  validCol(Y) :- member(Y,[1,2,3]).
```

For upper case(line4~line7):

```
?- make.
true.

?- ttt_move(x,R,C).
go for win
R = 1,
C = 2 ;
false.
```

For the second case(line9~line12):

```
?- make.
% d:/tamu修課資料/625/proj2/myanswer/prob8 compiled 0.00 sec, 0 cla
true.

?- ttt_move(x,R,C).
move to block opponent!
R = 3,
C = 2 ;
false.

?- ttt_move(o,R,C).
go for win
R = 3,
C = 2 ;
false.

?-
```

Problem9: prob9.pl

If you want to change Facts of state description, you have to replace it in the prob9.pl, between line 3 and line 22.

The index representation is **(X,Y) = (Column index, row Index).**

```
1   %prob9
2
3   visited(1,1).
4   visited(2,1).
5   visited(1,2).
6   stench(2,1).
7   breeze(1,2).
8
9   %visited(1,1).
10  %visited(2,1).
11  %visited(1,2).
12  %stench(2,1).
13  %breeze(1,2).
14  %visited(2,2).
15
16  %visited(4,1).
17  %visited(4,2).
18  %visited(4,3).
19  %visited(4,4).
20  %stench(4,2).
21  %breeze(4,3).
22  %breeze(4,4).
```

For case1(line3~line7):

```
?- make.
true.

?- candidate(X,Y).
X = 1,
Y = 3 ;
X = Y, Y = 2 ;
X = Y, Y = 2 ;
X = 3,
Y = 1 ;
false.

?- move(X,Y).
X = Y, Y = 2 ;
X = Y, Y = 2 ;
false.

?-
```

For case2(line9~line14): the warning suggests switch line14 to line12 to make similar facts close, but without any switch it still works correctly.

```
?- make.
Warning: d:/tamu修課資料/625/proj2/myanswer/prob9.pl
        Clauses of visited/2 are not together in the source-file
          Earlier definition at d:/tamu修課資料/625/proj2/myanswer/prob9.
          Current predicate: breeze/2
          Use :- discontiguous visited/2. to suppress this message
% d:/tamu修課資料/625/proj2/myanswer/prob9 compiled 0.00 sec, 1 cla
true.

?- candidate(X,Y).
X = 1,
Y = 3 ;
X = 2,
Y = 3 ;
X = 3,
Y = 1 ;
X = 3,
Y = 2 ;
false.

?- move(X,Y).
X = 2,
Y = 3 ;
X = 3,
Y = 2 ;
false.
```

For case3(line16~line22):

```
?- make.
% d:/tamu修課資料/625/proj2/myanswer/prob9 compiled 0.00 sec, 1 cla
true.

?- candidate(X,Y).
X = 3,
Y = 1 ;
X = 3,
Y = 2 ;
X = Y, Y = 3 ;
X = 3,
Y = 4 ;
false.

?- ww_move(X,Y).
X = 3,
Y = 1 ;
false.

?
```