

Computational Logic: CS 6374
CS 6374: Homework

All exercise numbers refer to the Sterling and Shapiro text book.

1. Exercises 8.3.1 (i), (iii), (vi), (vii)
2. Exercises 9.2.1 (i), (ii), (iv), (v).
3. Exercises 11.3 (i) and (ii)
4. Solve the Belgian Snake Problem (see attachment)
5. Program the N-Queen problem from the book, as discussed in class
6. Write a Prolog program to solve cryptarithmic addition problems such as

$$\begin{array}{r} \text{S E N D} \\ + \text{M O R E} \\ \hline \text{M O N E Y} \end{array}$$

The solution is $D = 7$, $E = 5$, $M = 1$, $N = 6$, $O = 0$, $R = 8$, $S = 9$, $Y = 2$. Each letter should stand for a unique digit. If there is a solution, Prolog should return the list of letters and corresponding digits. If there is no solution, Prolog should report 'no'.

7. Solve the stable marriage problem in Exercise 14.1 (ii) pg. 261
8. Program the block worlds problem described in the book (program the intelligent behavior using `choose_action` on page 269). Assume that there are 3 locations **p**, **q** and **r**, and five blocks **a**, **b**, **c**, **d**, **e**. Generate a plan to go from initial configuration shown below to final configuration shown below.

Initial configuration:

b		e
a	c	d
<hr/>		
p	q	r

Final configuration:

e		a
d	b	c
<hr/>		
p	q	r

9. Consider the missionary-cannibal problem. Three missionaries and three cannibals come to a river that they want to cross and find a boat that holds two. If the cannibals ever outnumber the missionaries on either bank, the missionaries will be eaten. Think of this problem as a planning problem and program it in Prolog. You should print a sequence of moves (one per line) that lists the people crossing the river at each step. You can

represent the 3 cannibals as c1, c2 and c3, and the three missionaries as m1, m2 and m3. For example, the move:

c1 m1

means that cannibal c1 and missionary m1 went from the bank where the boat is to the other bank. Keep in mind that the boat is always needed to go from one side to another.