

## Assignment 1, Constraint Satisfaction For Decision Making (CE884-7-SP), 2008-09 Set by Edward Tsang, University of Essex

### 1. Introduction:

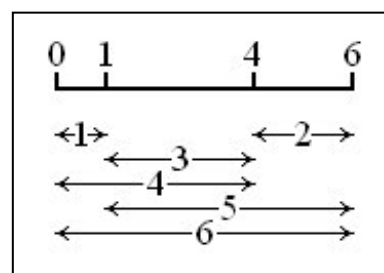
This is an assignment on problem formulation. This assignment accounts for 10% of your total marks in this course. This assignment should be submitted electronically. The deadline of this assignment is **11:59:59, Friday 20 February 2009**.

### 2. Objective:

The objective of this assignment is to give you a chance to formulate a constraint satisfaction problem.

### 3. The Golomb Ruler:

In mathematics, a Golomb Ruler is a set of marks at integer positions along an imaginary ruler such that no two pairs of marks are the same distance apart. The smallest mark is customarily put at 0. An example ruler is shown on the right, with markers 0, 1, 4 and 6 (source: [http://en.wikipedia.org/wiki/Golomb\\_ruler](http://en.wikipedia.org/wiki/Golomb_ruler)). The number of marks on the ruler is its *order* (which is 4 in the example shown), and the largest distance between two of its marks is its *length* (which is 6 in our example).



### 4. Your task:

Formulate the Golomb Ruler problem of order 5 as a constraint satisfaction problem. You must state clearly what the variables, domains and constraints are, and why they should be part of the formulation. Bonus will be given if your formulation is general for any order, i.e. not specific to order 5.

### 5. Submission requirements:

Write your name clearly on the first page of your submission. Underline your surname. Submit a report of strictly no more than 1,000 words, stating your formulation of this problem. State precisely the variables, domains and constraints. Clearly explain how you arrive at your formulation. State clearly where domain-specific knowledge is used. Evaluate the size of your search space. Explain how any of the constraints that you have defined might be particularly useful for solving the problem.

### 6. Assessment criteria for this assignment:

Correctness in formulation is the main criteria for evaluating your report. It is also important that you explain your formulation clearly. Reference should be made to constraint satisfaction techniques that you have learned in the lectures.

### 7. Please refer to the Student's handbook on the Departmental Policy on Plagiarism and Late Submission

## **Assignment 2, Constraint Satisfaction For Decision Making (CE884-7-SP), 2008-09**

### **Set by Edward Tsang, University of Essex**

#### **1. Introduction:**

This assignment follows from Assignment 1. It accounts for 10% of your total marks in this course. This assignment should be submitted electronically. The deadline of this assignment is *11:59:59, Friday 20 March 2009*. You must submit a report by the above deadline.

#### **2. Objective:**

The objective of this assignment is to test your ability to identify relevant techniques in constraint satisfaction for solving a given problem.

#### **3. Your task:**

You should first state the formulation that you have chosen to tackle. (This does not have to be the formulation that you submitted in Assignment 1.) Then your task is to explain what search techniques you would consider relevant. Explain why those techniques are relevant to solving this problem.

#### **4. Programming language and programming platform:**

You may use Prolog, Lisp, C, C++, Java, C-Sharp or Basics for implementation. To enable me to run your program, it must run in our labs. You may also use packages such as ZDC (which is available from <http://www.brasil.net/CSP/cacp/cacpdemo.html>).

#### **5. Submission requirements:**

Write your name clearly on the first page of your submission. Underline your surname. Please submit electronically:

- a) Your programs, in both source code and compiled code if applicable;
- b) A report, showing how your program should be run and output of your program. The format of the input must be clearly stated. Your program should provide information that helps others to understand how your algorithm works, and how efficient or otherwise it is.
- c) A report of no more than two A4 pages (font size 11, figures included), stating clearly how your program works. Give your evaluation of (i) the efficiency and (ii) the robustness of your program. Report any limitations of your program.

#### **6. Assessment criteria for this assignment:**

50% of the marks will be awarded to your description of the algorithm and 50% for the implementation. You will be assessed on whether you can identify constraint satisfaction techniques relevant to the problem. Correctness is of the highest importance, though tidiness and elegance of your program will be rewarded. You will also be assessed on clarity of your explanation, in both your report and your program. This means marks will reflect the readability of the program and its output or GUI, which should be succinct.

#### **7. Please refer to the Student's handbook on the Departmental Policy on Plagiarism and Late Submission**