

**Artificial Intelligence**  
**Homework 2**  
**For Sept. 18**

1. Consider the CSP problem with 5 variables  $x_1, \dots, x_5$  each with the domain  $\{0, 1, 2\}$  and the following constraints:

$$\begin{aligned}x_1 + x_2 &= 3 \\x_4 &= 2 \\x_3 + x_4x_5 &= 2 \\x_3 &> x_5 \\x_1 + x_4 &= 2\end{aligned}$$

Is the CSP node-consistent? If not, restrict the domain and remove constraints to make it node-consistent and write now the new conditions.

Not node consistent,  $x_4$  cannot take any value. If the domain of  $x_4$  is set to  $\{2\}$  then it becomes node consistent. That equation can also be removed.

2. Start with the end result of the previous problem. Is it edge-consistent? If not, restrict the domain and remove constraints to make it edge-consistent and write now the new conditions.

It is not edge consistent. If we restrict the domains, it becomes edge-consistent.  $x_1 \in \{0\}$ ,  $x_2 \in \{\}$ ,  $x_3 \in \{2\}$ ,  $x_4 \in \{2\}$ ,  $x_5 \in \{0\}$ .

3. Does the CSP have any solutions? If so, write down all of them.

No. There is no consistent choice for  $x_2$ .

4. Do problem 6.8 in the book.

There are a variety of solutions available online.