Homework 2 CSPS

1. Basics

(1.)

- **Variables:**
  Let $B = \{B_0, B_1, \ldots, B_{23}\}$ be the set of one-hour time blocks available in a day (24 hours a day).
- **Domains:**
  Assume we have 4 pieces of homework, let $H = \{H_1, H_2, H_3, H_4\}$ be the set of these 4 homework tasks. Each homework piece H_j has an associated amount of uninterruptible time d_j hours. Each time block B_i has a **domain:** $D_i = \{\text{none}, H_1, H_2, H_3, H_4\}$, which represent which homework can be scheduled during one-hour block B_i.
- **Constraints:**
  - Each homework H_j must be allocated to consecutive one-hour time blocks that sum up to the entire duration d_j.
  - All homework must be completed (i.e. For each homework H_j, there must be a sequence of consecutive time blocks $B_{i_1}, B_{i_2}, \ldots, B_{i_{d_j}}$ such that H_j is scheduled in each of these time blocks).
  - No two homework can be in the same time block (i.e. there is not a time block B_i such that B_i is scheduled with both H_x and H_y where $x \neq y$).
  - If H_x is a prerequisite for H_y, then H_x must be scheduled before H_y (e.g. if homework H_2 is dependent on homework H_1, then H_1 must be finished before H_2).

(2.)

(a) Unary constraints apply to **one** variable.

(b) Binary constraints apply to **two** variables.

(c) Ternary constraints apply to **three** variables.

(d) n-ary constraints apply to **n** variables, where n is an integer greater than 0.

2. Complex

(1.)

(a) **Unary:** 3 | **Binary:** 4 | **Ternary:** 0

(b) **Unary:** 1 | **Binary:** 4 | **Ternary:** 1

(2.)

(a) **Answer:** B

(b) **Answer:** A

(c)

(i.) **Answer:** B (Constraint violated)

(ii.) **Answer:** C (Game unsolved)

(d) **Answer:** A (Unique solution)

	1	1
1	mine	
	1	1

(3.)

(a) **Answer:** D

(b) **Answer:** B

3. CSPs: Domains and Arc Consistency

(1.)

For A: 2,3,4
For B: 2,3,4

(2.)

True Statements: (i), (ii), (iii)

(3.)

True Statements: (i), (iii), (v)