



Assignment 5

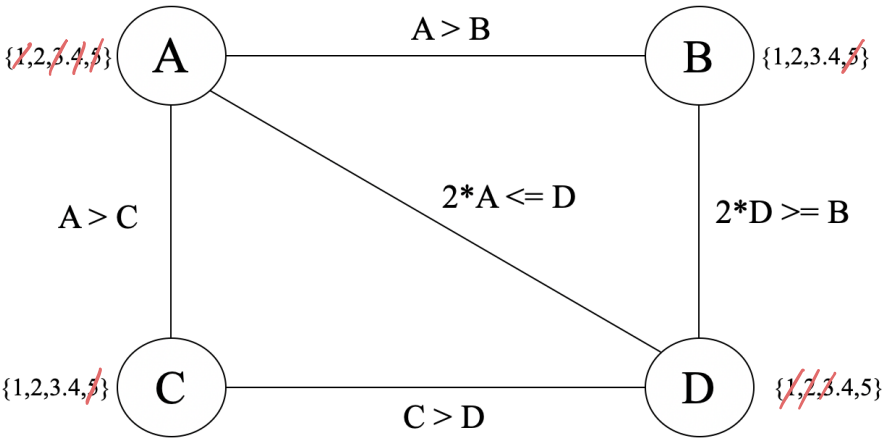
Due: **Thursday, Oct. 12<sup>th</sup>** 2023 @ 11:59 pm

Rules:

- 1. You are allowed to discuss the questions with your classmates. However, each student must write her own answer and develop her own argument.
- 2. You are NOT allowed to look at online published solutions.
- 3. Some questions are supposed to encourage you to read more on the topics taught in class.

First Question:

Consider the following constraint graph. Trace Arc Consistency (AC3) algorithm on this graph. **If nothing has changed use "="**.



Arcs	A	B	C	D	Added arcs
AB	{2,3,4,5}	//	//	//	CA, DA
BA	//	{1,2,3,4}	//	//	DB
AC	//	//	//	//	—
CA	//	//	{1,2,3,4}	//	DC
AD	{2}	//	//	//	BA, CA
DA	//	//	//	{4,5}	BD
BD	//	//	//	//	—
DB	//	//	//	//	—
CD	//	//	{}	//	AC
DC	//	//	//	{}	AD, BD

→ no solution

Second Question:

Propose a formulation of the following problems (games) in terms of CSP by specifying variables, domains, and constraints:

- Sudoku
- KenKen
- Cryptarithmic

sudoku:

variable: each cell in the  $9 \times 9$  cells

Domain: from 1-9

Constraints:

each row cell has a unique value from 1-9

each column cell has a unique value from 1-9

each box cell has a unique value from 1-9

KenKen:

Variable: each cell in column/row is a value

Domain: from 1-N depending on the grid length

Constraints:

each row cell has a unique value from 1-N

each column cell has a unique value from 1-N

each cage has satisfy the given operation and its result

Cryptarithmic:

Variable: each letter that represents a unique number

Domain: from 0-9

Constraints:

letters must have unique value

First letter/leading digit cannot have the value of 0

the equation should be satisfied