EXERCISES

Final exam

How?

- Exam with exercises and theoretical questions

Topics

- Search strategies
- Constraint satisfaction problems
- Soft constraint satisfaction problems
- CP-nets
- Stable matching problems
- Multi-agent decision making:
  preference reasoning and voting theory
- Bayesian networks
- Planning

Ex 1

Questions (CSP)

- Assume there is a binary constraint between the variables X and Y. What does it mean that X is arc consistent w.r.t. Y?

- It means that

  for each value x in the domain of X,

  there is some value y in the domain of Y that satisfies the constraint between X and Y

Ex 2

Questions (CSP)

- How can we enforce X to be arc-consistent w.r.t. Y?

- Remove all the values x in the domain of X for which there is no corresponding value y in the domain of Y that satisfies the constraint between X and Y

Ex 3

Questions (CSP)

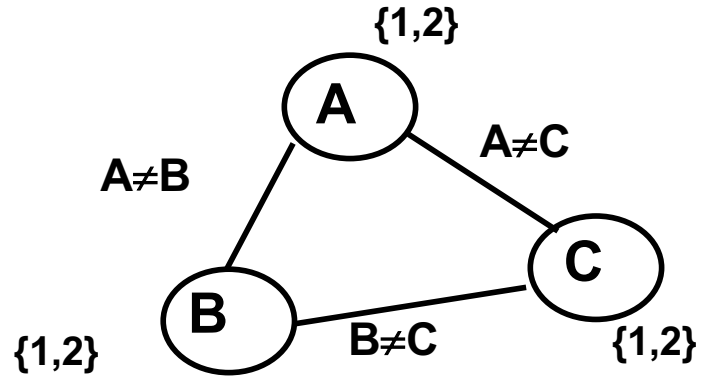
- What are the possible outcomes of the arc consistency algorithm?
  - At least one domain could be empty, in which case there is no solution
  - Each domain could have a single value, in which case there is a unique solution
  - Or some domains could have multiple values

Ex 4

CSP: arc consistency

- Provide an example of a constraint satisfaction problem which is arc consistent but with no solution.

- Consider a CSP problem with three variables A, B, and C with the same domain D={1,2} and the three constraints A ≠ B, B ≠ C and A ≠ C



Ex 5

CSP: forward checking

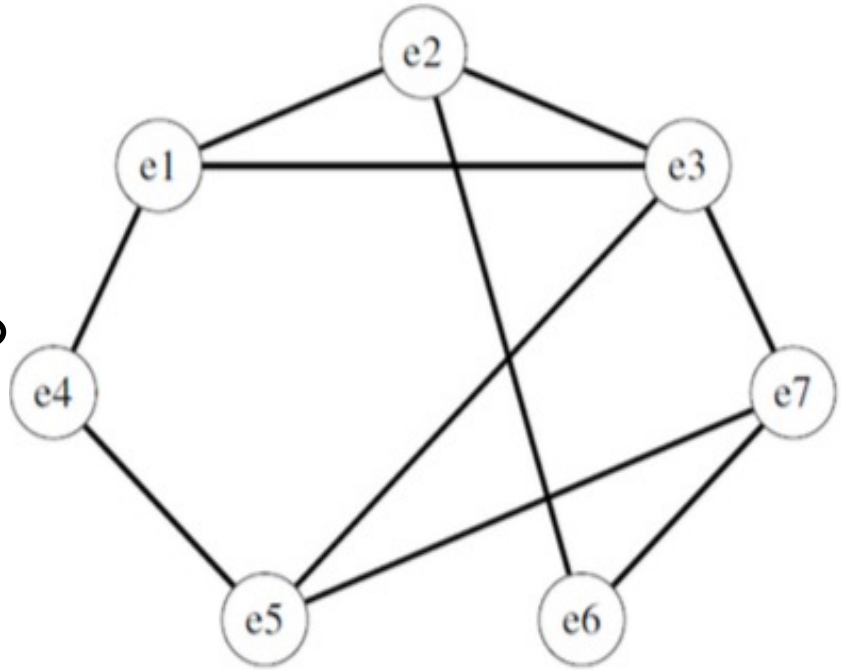
Consider a map coloring problem
that can be modelled via a CSP with:

- Variables: e1, e2, e3, e4, e5, e6, e7
- Domain of e1, e2, e3, e4, e5, e6, e7: { R , G , B }
- Constraints: specified by the constraint graph shown in the next slide

CSP: forward checking

Constraints: specified by this constraint graph

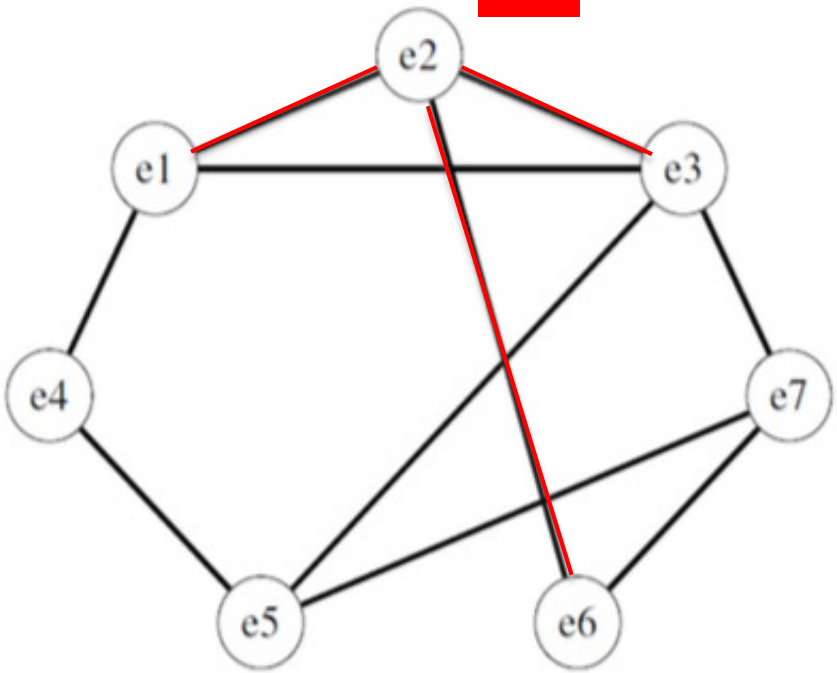
There is an arc between two variables if they must have different colors



Show how the domains change when you apply Forward checking to this map coloring problem after the assignment of R (red) to the variable e2

CSP: forward checking

R



E1	E2	E3	E4	E5	E6	E7
~~R~~ G B	R	~~R~~ G B	R G B	R G B	~~R~~ G B	R G B