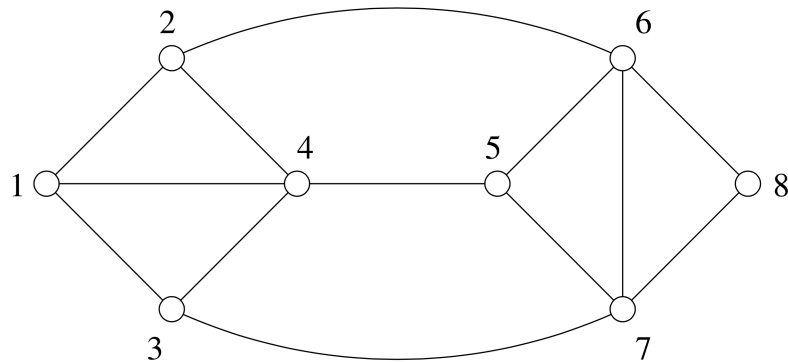# Artificial Intelligence: Supervision 2

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5 Constraint Satisfaction Problems

1. Consider the following constraint satisfaction problem:

We want to colour the nodes using the colours red (R), cyan (C) and black
(B) in such a way that connected nodes have different colours.

- Assume we attempt the assignments $1 = R$, $4 = C$, $5 = R$, $8 = C$,
  $6 = B$. Explain how forward checking operates in this example, and
  how it detects the need to backtrack.

- Will the AC-3 algorithm detect a problem earlier in this case? Explain
  the operation of the algorithm in this example.

- Implement the AC-3 algorithm and use it to verify your answer to the
  preceding problem.

6 Knowledge representation and reasoning

1. There have in fact been two queries suggested in the notes for obtaining a
   sequence of actions. The details for

$$\exists a \exists s. sequence(a, s_0, s) \wedge goal(s)$$

were given on the last slide, but earlier in the notes the format

$$\exists actionList. Goal(\ldots actionList \ldots)$$

was suggested. Explain how this alternative form of query might be made to work.

2. Making correct use of the situation calculus, write the sentences in FOL required to implement the Shoot action in Wumpus World.