

2 Artificial Intelligence II (SBH)

Evil Robot hates kittens. He has invented the *kitty-destroyer* (KD) to rid the world of their menace. To test it, he has a kitten (K) next to the KD on his laboratory bench (B). He has to open the KD, place the kitten inside it, close it and press the start button (SB). He has not however established that this sequence of events will lead to his goal of a destroyed kitten. Evil Robot is equipped with a planning system based on a solver for *constraint satisfaction problems*, and wants to use this to construct a plan.

- (a) Explain how this problem can be represented using the *state-variable* representation, including in your answer specific examples of a *domain*, a *rigid relation*, a *state variable* and an *action* for the problem. [7 marks]
- (b) Give *one* reason that a state-variable representation might be preferable to a representation aimed at encoding to a satisfiability problem. [1 mark]
- (c) Explain, giving a specific example for this problem, how the *action* taken at some time t can be encoded as part of a constraint satisfaction problem. [3 marks]
- (d) Explain, giving a specific example for this problem, how a *state-variable* can be encoded as part of a constraint satisfaction problem. [4 marks]
- (e) Explain, giving a specific example for this problem, how a *precondition* for an action can be encoded as part of a constraint satisfaction problem. [5 marks]