

## Assignment 2: Logic and Planning

### Solution

#### Question 1

##### Solution

- (a) One model is where all atoms are true. Another is where  $c, f, d, b$  are true and every other atom is false (this is the minimal model, and is a subset of every model).
- (b) E.g., any interpretation where  $c$  is false, such as the interpretation where every atom is false.
- (c)  $c, f, d, b$
- (d)  $a, e, g, h$
- (e) (i) There are two minimal explanations for *leaving*, namely:  $\{acl, fire\}$  and  $\{acl, tampering\}$ .
- (ii) There is one minimal explanation for  $leaving \wedge smoke$ , namely  $\{acl, fire\}$ .

#### Question 2

##### Solution

See [http://www.cs.ubc.ca/~poole/cs502/2013/as2/plumbing\\_ws.ailog](http://www.cs.ubc.ca/~poole/cs502/2013/as2/plumbing_ws.ailog) for a solution for (a)-(d).

Figure 1 shows the interpretation for the symbols in (d).

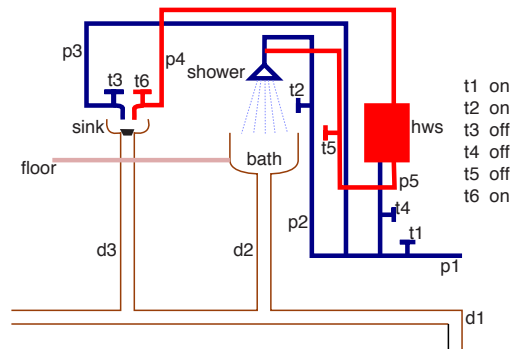


Figure 1: The Plumbing Domain

See [http://www.cs.ubc.ca/~poole/cs502/2013/as2/plumbing\\_ass.ailog](http://www.cs.ubc.ca/~poole/cs502/2013/as2/plumbing_ass.ailog) for a solution for (e). Note that you were not expected to add integrity constraints, because we did not cover this, but it makes for more interesting reasoning.

#### Question 3

**Solution** The actions are the teaching of topics. E.g., *teach\_logic*, *teach\_planning*.

The preconditions of the actions are what the student needs to know before teaching a topic. E.g., the preconditions for *teach\_planning* may be *knows\_logic* and *knows\_search*. The effect of the action is the knowledge expected after the action, e.g., the effect of *teach\_planning* may be *knows\_planning*. Or in terms of the feature based representation, *knows\_planning* is true after an action if the action is to *teach\_planning* or if *knows\_planning* is true before the action.

The initial state specifies what the student already knows, e.g., *knows\_search*. A goal specifies the knowledge the student wants to achieve e.g., *knows\_planning*.

Then you need to use these to explain the algorithms.

#### Question 4

**Solution** There are many correct answers. Make sure the answer you give is correct.

#### Question 5

**Solution** See the wiki for possible solutions.

#### Question 6

**Solution** You were meant to learn about reasoning in terms of logic, and about planning (the best way to learn a topic is to try to teach it!).

It should have taken a few hours.