COMP21111 January 2012 Exam
Student Performance Feedback

Question 1

(a) Most answers demonstrated knowledge of the DPLL algorithm, but did not use a consistent method of splitting. Some errors where branches had been missed out at a splitting step. A lot of answers found the satisfying branch, but then still gave the rest of the tree.

(b) Parts 1 & 2 generally answered well. Parts 3 & 4 had a lot of incorrect answers - they are both true due to the state $x = 1 \land y = 1$ being unreachable. Many answers failed to explain why they were true or false.

(c) Most answers found the unsatisfied clauses correctly. Of these, most found the probabilities correctly. Incorrect probabilities typically found by counting the number of variables in the two clauses, rather than first selecting a clause then selecting a literal in this clause. Some answers stated that "WSAT *would* choose p2", when it is only *most likely* to choose it.

Question 2

(a) Most answers gave the domain axiom correctly, but few calculated the number of variable occurrences correctly. Some wrong answers calculated the number of clauses in the domain axiom.

(b) Some good answers. A typical error started with the formula equal to 1, rather than 0, which does not prove validity/tautology. Lots of errors where rules were applied incorrectly, typically $p \land r = 0$ (and similar formulas) going to two inline formulas rather than the correct rule which uses splitting. Some errors where small steps were missed out, for instance $\neg q = 0$ must be written in the tableau before then using the rule for negation to get $q = 1$.

(c) Part 1 - about half right, half wrong. The state $x = 1 \land y = 1$ exists, just not in the transition system. Part 2 - generally ok. Part 3 - generally ok, but some errors where only one backward reachable state was found, not both of them.

Question 3

(a) Part 1 - generally done well. The most common mistake was putting the quantifiers in the wrong place in the tree. Part 2 - the free occurrence of p was the one most often missed. Part 3 - some nice answers about rectification, but some not clear that it is a problem of free and bound variables having the same name. When rectifying, a lot only renamed one or other of the bound variables, and some also renamed the free variables.

(b) Generally correct. A few answers incorrectly given using logical formulas not models of the variables.

(c) Part 1 - generally correct, but some missing initial "always" operator. Part 2 - Mostly right, but some missing initial "always" operator, and some saying $\Diamond\Box A$ which is wrong. Part 3 - A lot of incorrect answers of $\Box(A \to \Box\neg A)$ which never allows A to occur at all.

Question 4

(a) Some nice answers, but also a lot of confusion. Errors included either ignoring the quantifiers or splitting not in the order of the quantifiers. Another typical error was to draw the tree without coming to any conclusion about the truth or falsity of the formula.

(b) Many good answers. Main error was for students to use GSAT to find a model, not WSAT.

Question 5

(a) About a half answers right. Many errors in applying distributivity, numerous other small errors. Several answers where the result was not in CNF.

(b) Not a hard question, too many incorrect results (giving a path on which both formulas are true or both are false).

(c) Majority of answers built the initial OBDD, only one did quantifier elimination correctly. There were several answers building a datastructure that was not an OBDD (e.g. just a decision tree).