

COMPUTER SCIENCE TRIPOS Part IB – 2016 – Paper 6

6 Logic and Proof (LCP)

(a) Write brief notes on Satisfiability Modulo Theories (SMT). Explain how SMT works and what sort of problem it can solve. [4 marks]

(b) Outline the basic ideas behind Fourier-Motzkin variable elimination, demonstrating them by solving the following set of constraints:

$$x + z \geq 5 \quad y + z \geq 5 \quad y - 2z \geq -2 \quad x + y + z \leq 7$$

[8 marks]

(c) Briefly describe an algorithm for constructing a Binary Decision Diagram (BDD) without first constructing the full binary decision tree. Illustrate your answer by constructing the BDD for $(P \vee R) \rightarrow (P \wedge (Q \oplus R))$, where \oplus denotes exclusive OR.

[8 marks]