

COMPUTER SCIENCE TRIPOS Part IB – 2017 – Paper 6

3 Computation Theory (AMP)

- (a) Give register machine programs for the following operations:
- (i) Non-destructively copying the contents of register X to register Y. [2 marks]
  - (ii) Assigning to registers X and Y the values 0 and  $2^x(2y + 1)$ , where  $x$  and  $y$  are the starting values in X and Y. [3 marks]
  - (iii) Assigning to registers X and Y the values  $x$  and  $y$ , where 0 and  $2^x(2y + 1)$  are the starting values in X and Y. [5 marks]
- (b) What does it mean that a register machine *decides the Halting Problem*? Prove that no such register machine exists. [10 marks]