

2001 Paper 3 Question 9

Computation Theory

- (a) Describe the action of a Turing machine. [4 marks]
- (b) Define what is meant by a configuration of an N -state, k -symbol Turing machine. [2 marks]
- (c) Explain briefly how to enumerate all possible Turing machine computations, so that a given computation can be characterised by a single natural number code c . [5 marks]
- (d) Show that it is not possible to compute the maximum distance travelled by the Turing machine head from its initial position during halting computations as a function of the code c . Any results that you use should be stated clearly. [9 marks]