2000 Paper 3 Question 9

Computation Theory

One of the most important contributions of the theory of computation has been to establish that the halting problem is not decidable. Give a clear statement of this result (you are not asked to prove it). [5 marks]

Define a *configuration* of a 2-register machine at a particular point during the execution of some program. [3 marks]

By considering the total number of configurations or otherwise, show that it is not possible to compute an upper bound for the contents of the two registers during halting computations as a function of the program code and the initial contents of the two registers. [12 marks]