Computation Theory

Show how to code the program and initial data for an $n$-register machine into natural numbers $p$ and $d$. In what sense do the codes $p$ and $d$ determine a unique computation? [9 marks]

Using your codes establish a precise statement of the Halting Problem for Register Machines. [3 marks]

Assume that the Halting Problem is in general undecidable. Prove that it cannot be decided whether a general program $p$ terminates when the initial data is zero in every register. [8 marks]