1999 Paper 11 Question 8

Mathematics for Computation Theory

Let S be a finite alphabet. Define

(a) the set of events E over S

(b) acceptance of an event E by a deterministic finite automaton (DFA) M

(c) the regular operators on events

(d) the set of regular events over S

[9 marks]

State Kleene's Theorem. [2 marks]

Suppose that the event E is accepted by an N-state DFA $M \equiv (Q, S, \iota, f, A)$. Show that if E is non-empty, then M must accept some word w such that $\ell(w) < N$.

[5 marks]

Let regular events E, E' over the same alphabet S be accepted by DFA M, M' respectively. Show that it is decidable whether $E = E'$. [4 marks]

[If you use the Pumping Lemma it should be clearly stated.]