1997 Paper 11 Question 8

Mathematics for Computation Theory

The events E, E' over finite alphabets S, S' are recognised by deterministic finite automata M, M' respectively. Show from first principles that there is a deterministic finite automaton $M_\cap$ that recognises the intersection $(E \cap E')$ of the two events. [10 marks]

Let S be the finite alphabet $\{a, b, c\}$.

(a) Let E be the event over S consisting of those words which contain an odd number of occurrences of a. Construct a deterministic finite automaton to recognise precisely the event E. [4 marks]

Write down a regular expression that denotes E. [2 marks]

(b) Let F be the event over S consisting of those words which contain an even number of occurrences of each of the symbols a, b, c. Show that F is regular. [4 marks]