1995 Paper 4 Question 3

Regular Languages and Finite Automata

Define a *regular grammar*. [2 marks]

Define a *regular expression*. [2 marks]

Show that regular grammars and regular expressions characterise the same class of languages. [6 marks]

The syntax of a propositional calculus can be described by the context-free grammar $G = \langle Vn, Vt, P, S \rangle$

$$\begin{aligned} &\text{where } Vn = \{S\}, Vt = \{not, if, then, and, or, p, q, r\}, \\ &P = \{S \to p,\ S \to q,\ S \to r, \\ &\quad S \to not\ S, \\ &\quad S \to if\ S\ then\ S, \\ &\quad S \to S\ or\ S, \\ &\quad S \to S\ and\ S\} \end{aligned}$$

Construct a push-down automaton which accepts the set of strings generated by G. [10 marks]