1998 Paper 7 Question 11

Specification and Verification II

Describe informally the meaning of the following four CTL operators: AX, EX, $A[\cdots U \cdots]$, $E[\cdots U \cdots]$. [4 marks]

Describe how CTL operators can be defined in higher order logic. [4 marks]

Hence or otherwise show that $A[true\ U\ P]$ holds if P holds somewhere along every path. [2 marks]

Define $AG\ P \equiv \neg E[true\ U \neg P]$ and show that $AG\ P$ holds if P holds everywhere along every path. [4 marks]

Express "if P is ever true, then it continues to be true until Q is false" in CTL. [3 marks]

Describe in English the meaning of $AG(P \wedge Q \Rightarrow AX(A[P\ U\ \neg Q]))$. [3 marks]