2010 Paper 7 Question 14

Specification and Verification I

(*a*) Explain carefully the meaning of a Hoare specification $\{P\}C\{Q\}$ and describe the nature of P, C and Q.   [4 marks]

(*b*) How can terms in higher-order logic be used to represent P, C and Q? Give the types of the terms.   [4 marks]

(*c*) Describe the meaning of the *weakest liberal precondition* (wlp) and the *strongest postcondition* (sp).   [4 marks]

(*d*) Define wlp and sp in higher-order logic. What are the types of wlp and sp?   [4 marks]

(*e*) Explain the relationships between Hoare specifications, weakest liberal preconditions and strongest postconditions. What is the importance of this for automating program verification?   [4 marks]