2009 Paper 7 Question 14

Specification and Verification I

(*a*) Explain the difference between the *soundness* and *completeness* of a deductive system. [4 marks]

(*b*) Why is soundness generally thought of as more important than completeness? [4 marks]

(*c*) Give an example of a true partial correctness specification that cannot be proved in the version of Hoare logic presented in the lectures. Explain why your example cannot be proved. [4 marks]

(*d*) Devise an instance of the following rule to show that it is not sound.

$$\frac{\{P\}\ C\ \{Q\}}{\{P \wedge R\}\ C\ \{Q \wedge R\}}$$

[4 marks]

(*e*) Devise sufficient conditions on C and R that make the rule above sound. Briefly explain why your conditions ensure soundness. [4 marks]