

## 2008 Paper 8 Question 16

### Specification and Verification I

- (a) What is the difference between partial and total correctness? Illustrate your answer using the WHILE-Rule. [4 marks]
- (b) What are derived rules? Give an example of a derived rule, together with its derivation. [4 marks]
- (c) If  $\{P\} C \{Q\}$  is a theorem of Hoare logic and if  $C$  is correctly annotated then will the verification conditions necessarily be provable? Justify your answer. [4 marks]
- (d) Would a Java program that translates Hoare formulae to semantically equivalent higher-order logic formulae be a deep embedding or a shallow embedding? Justify your answer. [4 marks]
- (e) Describe the meaning of the dynamic logic formulae  $[c]q$  and  $\langle c \rangle q$ . For deterministic commands, describe how partial and total Hoare logic correctness specifications can be formulated in terms of dynamic logic. [4 marks]