

2003 Paper 8 Question 12

Specification and Verification I

- (a) Define the specification $[P, Q]$ as used in program refinement. [2 marks]
- (b) Devise refinement rules for **FOR**-commands. [8 marks]
- (c) Show how your rule can be justified using Floyd–Hoare logic. [4 marks]
- (d) Use your rule to show that

$$[\text{SUM}=0 \wedge 1 \leq M, \text{SUM} = M \times N] \supseteq \text{FOR } I := 1 \text{ UNTIL } M \text{ DO } \text{SUM} := \text{SUM} + N$$

[6 marks]