

# 1997 Paper 7 Question 1

## Specification and Verification I

The command  $\text{REPEAT } (E) S$  is executed by repeating  $S$  exactly  $n$  times, where  $n$  (assumed greater than zero) is the value of  $E$  in the initial state.

Devise a Floyd–Hoare style proof rule for establishing partial correctness specifications of the form  $\{P\} \text{REPEAT } (E) S \{Q\}$ . [6 marks]

Justify the correctness of your rule informally. [4 marks]

What verification conditions should  $\text{REPEAT } (E) S$  generate? [4 marks]

Prove

$$\{Y \geq 0\} Z := 0; \text{REPEAT } (Y) Z := Z + X \{Z = X \times Y\}$$

[6 marks]