

2001 Paper 8 Question 12

Specification and Verification I

- (a) Describe the axioms and rules of Floyd–Hoare logic for reasoning about FOR-commands. Carefully explain any side conditions. [8 marks]
- (b) Let $n!$ be the factorial of n ($0! = 1$ and $(n + 1)! = (n + 1) \times n!$). Give a proof of

$$\{N \geq 0\} X := 1; \text{ FOR } Y := 2 \text{ UNTIL } N \text{ DO } X := X \times Y \{X = N!\}$$

[12 marks]