1995 Paper 8 Question 1

Specification and Verification I

Explain the term *partial correctness specification*. Illustrate your answer by giving and explaining the primitive rules of partial correctness for assignment, sequencing and while commands. [5 marks]

Are your rules complete for a language consisting of only these commands? Explain your answer. [3 marks]

Derive a rule for partial correctness statements of the form

    {P} WHILE K≠E DO C; K:=K+1 OD {Q}

where P and Q are arbitrary statements. Give the derivation. [4 marks]

Give a suitable invariant for the loop in the partial correctness statement

    {T}
    Y:=N; X:=1; WHILE X≠N DO Y:=Y×X; X:=X+1 OD
    {X=N ∧ Y=N!} [2 marks]

Using your derived rule prove that this partial correctness statement is true. State clearly any mathematical facts you use. [6 marks]