

2007 Paper 8 Question 16

Specification and Verification I

- (a) What is the difference between the methods of refinement and *post hoc* verification? List *one* benefit of using refinement besides creating correct-by-construction programs. [4 marks]
- (b) What features are needed in a wide-spectrum language to support refinement? Illustrate your answer by describing constructs found in such a language that are not present in programming languages. [4 marks]
- (c) What are the “Laws of Programming” in relation to refinement? Illustrate your answer with a concrete example of a law and contrast your law with a related axiom or rule of Floyd–Hoare Logic. [4 marks]
- (d) What does it mean for refinement to be *monotonic*? Why is monotonicity important? [4 marks]
- (e) Exhibit a refinement of $[Y, X=0 \wedge Y=2 \times X]$ to $X:=0; Y:=0$. [4 marks]