

2008 Paper 5 Question 7

Concepts in Programming Languages

- (a) Write a procedure and a call to it in block-structured pseudocode such that the execution of the procedure under *pass-by-reference* and under *pass-by-value/result* yields different outcomes. Justify your answer.

[7 marks]

- (b) Explain the meaning of *static* (i.e. compile-time) and *dynamic* (i.e. run-time) type checking.

Compare the advantages and disadvantages of these two approaches to type checking from the point of view of the language designer, the language implementer, and the programmer.

[6 marks]

- (c) Explain how *objects* can be simulated in SML, giving an example.

Does it follow that SML, together with its module system, is an object-oriented programming language? Why?

[7 marks]