

## COMPUTER SCIENCE TRIPOS Part IB – 2012 – Paper 3

### 3 Programming in C and C++ (SCC)

In this question, where appropriate, you may use a short fragment of code to complement your explanation.

(a) (i) What is the difference between a local and global variable in C? (Consider variable scope, storage and initialisation.)

(ii) What are the properties of a static member variable in a C++ class?

[4 marks]

(b) (i) Briefly explain pointer arithmetic in C. Give an example code snippet involving pointers in which it would be *inappropriate* to use pointer arithmetic, and explain why.

(ii) Explain how in some respects pointers are equivalent to arrays, and give one respect in which they differ.

[4 marks]

(c) Explain why a function might be declared virtual in a C++ superclass.

[4 marks]

(d) (i) How does use of the void \* pointer in C allow a form of polymorphism? Give an example function declaration using the void \* pointer.

(ii) What is the main problem with the use of void \*, and how does C++ improve on this? Give the improved function declaration in C++ for your example function in part (d)(i).

[4 marks]

(e) (i) Why might it be useful to define a copy constructor for a C++ class? Give an example of a copy constructor for a simple class.

(ii) Why might it be useful to explicitly define the assignment operator (=) for a C++ class? Give an example definition of the assignment operator for a simple class.

[4 marks]