SOLUTION NOTES

Foundations of Programming in Java 2003 Paper 10 Question 3 (FHK)

Part a:

Any standard explanations of inheritance and instantiation will do. In the context of the program, class Child inherits from class Parent. Any instance of Child will inherit the data fields J and K and also the methods setK() and getK(). A method set() is declared in both Child and Parent and, in an instance of Child, the version of set() in Child will override the version of set() in Parent() though the latter is still accessible via super.set().

Part b:

This question requires an understanding of Java's rules of intialisation. With a clear head it is not difficult to see what happens but it is easy to go wrong. The order of calling is as follows:

1. When alf is assigned new Child(11) the constructor Child() is called.

2. The call super(j) in the constructor Child() calls the constructor Parent().

3. [THIS IS THE HARD BIT!] The call of this.set(j) in Parent() calls the set() method in Child NOT the set() method in Parent because the latter has been overridden.

4. The set() method in Child then calls super.set(j) and this DOES call the set() method in Parent.

5. The set() method in Parent prints out *** J is now 11 *** and then calls setK().

6. The setK() method prints out *** K is now 22 *** and returns

to the set() method in Parent which returns to the set() method in Child.

7. The set() method in Child now setH().

8. The setH() method calls getK() (inherited from Parent) and then prints out *** H is now 44 *** before returning to the set() method in Child which then returns to the set method in Parent which then returns to the Child() constructor.

9. The constructor Child() then calls setH()

10. The setH() method behaves as before. It calls getK() and then prints out *** H is now 44 *** (which is now printed for the second time). Return though is now to the constructor Child() which concludes its task. The new instance of Child, referred to by the variable alf, is now intialised.

11. The println() method in method main() now calls getH() prior to printing alf.H is 44.

The output from the program, as indicated above is:

```
*** J is now 11 ***
*** K is now 22 ***
*** H is now 44 ***
*** H is now 44 ***
alf.H is 44
```