SOLUTION NOTES

Foundations of Computer Science (short question) 2003 Paper 1 Question 1 (LCP)

(a) Bookwork from Lecture 10 (Functions as Values). The key point is that a function that yields another function has the same effect as a two-argument function. A practical advantage of this type of two-argument function: it can accept its first argument and become a useful function (in its second argument). One possible example is a sorting function, whose first argument is the ordering that controls the sorting and whose second argument is the list to be sorted. Fixing the ordering gives a sorting function that can be applied to many different lists.

(b) The function `f` takes a list of pairs and returns a pair of lists, mapping for instance `[(1,"eins"),(2,"zwei"),(3,"drei"),(4,"vier")]` to the pair `([1, 2, 3, 4], ["eins", "zwei", "drei", "vier"])`. Candidates should "walk through" the execution of this function. Lecture 11 (List Functionals) introduces the function `foldr`.

(c) This question will be easy for candidates who understand pattern-matching:

```
fun h [] = []
  | h [x] = [x]
  | h [x,y] = [x,y]
  | h (x::y::_::xs) = x :: y :: h xs;
```