

COMPUTER SCIENCE TRIPOS Part IA – 2004 – Paper 1

1 Foundations of Computer Science (ACN)

This question has been translated from Standard ML to OCaml

- (a) What does the OCaml function `map` do? Give an example, first coded without `map` and then with it, to illustrate how it can lead to more compact or comprehensible code. [3 marks]

- (b) Functions `fold_left` and `fold_right` might be defined as

```
let rec fold_left f e = function
  | [] -> e
  | x::xs -> fold_left f (f ex) xs

let rec fold_right f l e = match l with
  | [] -> e
  | x::xs -> f x (fold_right f xs e)
```

Explain what these two functions do and why they may be useful. [4 marks]

- (c) Here is a typical use of `map`:

```
let mangle n = (n - 2) * (n + 7)
let mangle_list x = map mangle x
```

Show how to express `mangle_list` using one of the “fold” functions rather than `map`. [3 marks]