

## COMPUTER SCIENCE TRIPOS Part IB – 2016 – Paper 3

### 3 Compiler Construction (TGG)

Programming answers should be written in some notation approximating SML or OCaml.

(a) Describe what is meant by *tail recursion*. [4 marks]

(b) Eliminate tail recursion from `foldl` given below. Explain your answer.

```
(*
  foldl : ('a -> 'b -> 'a) -> 'a -> 'b list -> 'a
*)
let rec foldl f accu l =
  match l with
  [] -> accu
  | a::l -> foldl f (f accu a) l
```

[8 marks]

(c) Eliminate tail recursion from the following mutually tail-recursive functions. Explain your answer.

```
let rec is_even n =
  if n = 0
  then true
  else is_odd (n - 1)

and is_odd n =
  if n = 0
  then false
  else is_even(n - 1)
```

[8 marks]