1 Foundations of Computer Science (ACN)

This question has been translated from Standard ML to OCaml

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

(b) Functions \texttt{fold_left} and \texttt{fold_right} might be defined as

\begin{verbatim}
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)
\end{verbatim}

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

(c) Here is a typical use of \texttt{map}:

\begin{verbatim}
let mangle n = (n - 2) * (n + 7)
let mangle_list x = map mangle x
\end{verbatim}

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