

## 1999 Paper 2 Question 9

### Software Engineering II

A Web browser is a complicated program. It must deal with many types of data (images, sound, etc.), support various network services and handle the many constructs of HTML (the language in which Web pages are written). Your manager asks you to lead a small group of programmers in implementing a Web browser. Describe top-down refinement; is it appropriate for your task? [6 marks]

Your manager further states that it is essential that your browser should almost never crash. How would you go about meeting this requirement? [6 marks]

Consider the following two ML functions:

```
fun sumfiv [] = 0
  | sumfiv (x::xs) = 5*x + sumfiv xs;

fun summing z [] = z
  | summing z (x::xs) = summing (z + x) xs;
```

Use structural induction to prove that `sumfiv xs` can be replaced by `5 * summing 0 xs`. [8 marks]