

2001 Paper 11 Question 13

Software Engineering II

(a) Describe, with examples, how the choice of programming language, programming tools and libraries can affect the reliability of the software developed using them. [5 marks]

(b) Consider the following pair of ML function declarations:

```
fun takew p [] = []
  | takew p (x::xs) = if p x then x :: takew p xs else [];

fun dropw p [] = []
  | dropw p (x::xs) = if p x then dropw p xs else x::xs;
```

Prove $(\text{takew } p \text{ } xs) @ (\text{dropw } p \text{ } xs) = xs$ using induction. (Assume that function p always terminates.) [8 marks]

(c) You have been asked to specify some banking software. A bank account has a *balance* and an overdraft *limit*, subject to the constraints $limit \geq 0$ and $balance + limit \geq 0$.

(i) Write a Z schema to specify the state of a bank account. [2 marks]

(ii) Write a Z schema for the operation to withdraw a given positive *amount* from the account. [5 marks]