

## 1996 Paper 12 Question 11

### Introduction to Functional Programming

Describe how recursive definitions are modelled in the  $\lambda$ -calculus using  $Y$ .  
[6 marks]

Consider the following attempt to define  $Y$  in ML:

```
val Y = fn f => (fn x => f (x x)) (fn x => f (x x))
```

Explain why this doesn't work.  
[6 marks]

Give a satisfactory definition of  $Y$  in ML and illustrate its use by defining the factorial function.  
[4 + 4 marks]