

## 2006 Paper 13 Question 6

### Compiler Construction

- (a) Describe a difference and a similarity between the notions of *overloading* and *polymorphism*. [2 marks]
- (b) Define the notion of *type safety* in a programming language. [2 marks]
- (c) Describe the linking phase and the difference between static and dynamic linking. [2 marks]
- (d) Suppose that a programming language allows nested functions. How might a stack-based implementation of `f` access the value associated with `a`?

```
int g(int a)
{
    int f(int x) {
        return a + x;
    }
    ...
    f(2);
    ...
}
```

[4 marks]

- (e) Describe the low-level code that could be generated by compiling the following code fragment for a stack-based target machine.

```
int f(int a, int b)
{
    int z = a * b;
    return a + z;
}
...
f(1, 2) * f(3, f(4, 5));
...
```

[10 marks]