2006 Paper 6 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]