

2007 Paper 11 Question 3

Programming in C and C++

A C programmer makes use of the `goto` construct as follows:

```
int test() {
    int x=0,y=0,i,j;
    int err=0;
    if ((y=init())==-1)
        goto error;
    for (i=1;i<10;i++) {
        for (j=1;j<10;j++) {
            if ((x=process(i,j))==-1) {
                err = 10*i+j;
                goto error;
            }
            y += x;
        }
    }
    return y;
error:
    printf("Something went wrong: %d %d\n",err/10,err%10);
    exit(1);
}
```

- (a) Rewrite the code in C, maintaining the same functionality but avoiding the use of `goto`. [3 marks]
- (b) By defining a suitable C++ class to contain the error parameters `i` and `j`, rewrite the above code using C++ exceptions. [5 marks]
- (c) Write a definition in C *or* C++ for a function `concat` that takes two strings `s1` and `s2` and returns a `char` pointer to heap memory containing a copy of the concatenation of `s1` and `s2`. [5 marks]
- (d) Write a macro `CONCAT` that takes two string literals as arguments and results in them being concatenated into a single string after the preprocessor has run. [2 marks]
- (e) Give *two* reasons why the following code is wrong:

```
#define b "UoCCL"
char a[] = "UoCCL";
char i[] = CONCAT(b,a);
char j = concat(a,b);
```

and outline the key differences between `CONCAT` and `concat`. [5 marks]