

# 淡江大學 100 學年度碩士班招生考試試題

69-

系別：資訊工程學系

科目：程式語言 C++

考試日期：2 月 28 日(星期一)第 2 節

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1. Give the output of each of the following C++ programs

(a) (8%)

```
#include <iostream>
int foo(double x, double y) { return x+y; }
int foo(int x, const int y) { return x+y+1; }
int main(int argc, char** argv) {
    const int x = 3;
    const int y = 2;
    std::cout << foo(x,y) << std::endl;
    std::out << "2:" << foo(2,3.) << std::endl;
    return 0;
}
```

(b) (8%)

```
#include <iostream>
main() {
    char* c;
    char strg[] = "ABCD";
    std::cout << "strg is " << strg << "\n";
    c = strg + 1;
    *c = 'X';
    std::cout << "strg is " << strg << std::endl;
    return(0);
}
```

(c) (4%)

```
#include <iostream>
#include <exception>
using namespace std;

int main () {
    try {
        throw 20;
    }
    catch (int e) {
        cout << "An exception occurred:" << e << endl;
    }
    return 0;
}
```

本試題雙面印刷

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(d)

```
#include <iostream>
#include <exception>
using namespace std;
class myexception: public exception {
    virtual const char* what() const throw(){
        return "My exception happened";
    }
} myex;
int main () {
    try {
        throw myex;
    }
    catch (exception& e) {
        cout << e.what() << endl;
    }
    return 0;
}
```

(8%)

(e)

```
#include <iostream>
#define sq(x)  x * x
int main(int argc, char** argv) {
    std::cout << "sq(5)=" << sq(5) << std::endl;
    std::cout << "sq(5+3)=" << sq(5+3) << std::endl;
    return 0;
}
```

(4%)

(f)

```
#include <iostream>
using namespace std;
class B {
public:
    virtual void f() { cout << "using : f" << endl; }
    void g() { cout << "using : g" << endl; }
    void testF() { f(); }
    void testG() { g(); }
};
class D : public B {
public:
    void f() { cout << "calling f" << endl; }
    void g() { cout << "calling g" << endl; }
};
int main() {
    D d;
    d.testF();
    d.testG();
    return 0;
}
```

(8%)

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2. What are differences between two constants 'c' and "c" in C++? (4%)
3. How to declare a *pure virtual function* pvf with an long integer input parameter named x? Further explain what a pure virtual function is. (8%)
4. What is the output of the following C++ program . (12%)

```
#include <iostream>
class Hard {
    enum { arr_l=3 };
    int *arr; // array of int
    int seed;
    char *name;
public:
    Hard(char *str, int i) : name(str), seed(i) {
        arr = new int[arr_l];
        for(int i=0;i<arr_l;arr[i]=seed + i++);
    }

    ~Hard() {
        std::cout << "arr destroyed for " << name << std::endl;
    }

    void print_arr() {
        std::cout << name << ":" << std::endl;
        for(int i=0;i<arr_l;i++)
            std::cout<<"Element #" << i << "=" << arr[i]<< std::endl;
    }

    void set_arr(int idx, int val) {
        arr[idx]=val;
    }
};

int main() {
    Hard q1("Q1",2), q2("Q2",10);
    q1.print_arr();
    q2.print_arr();
    q2 = q1;
    q1.set_arr(0, 32);
    q2.set_arr(1, 56);
    q1.print_arr();
    q2.print_arr();
}
```

背面尚有試題

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5. Read the following function  $f$  and answer questions below

```
int f(int a, int b) {  
    int q = 0;  
    int r = b;  
    while (r >= b) {  
        q = q + 1;  
        r = r - b;  
    }  
    return q  
}
```

(a) What is the operation computed by  $f$ ? (4%)

(hint: an arithmetic operation)

(b) State the relation between integer inputs  $a$  and  $b$  and variables  $q$  and  $r$ . (8%)

(hint: a math equation)

(c) This function is an unsafe function in C/C++, it fails to terminate the while-loop under some conditions. Find one of such bad conditions. (8%)

(hint: consider input values)

6. Write a *recursive* function in C++ which computes the square  $x^2$  of input long integer  $x$  without using any multiplication operations and global variables. (16%)

(hint: consider equation  $x^2 = [(x-1)+1]^2 = (x-1)^2 + 2(x-1) + 1$  and the recurrence relation  $a_n = a_{n-1} + 2n + 1$ )