

Name: YUAN Wenxuan  
University ID: 3036292740

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Instructions:

For each single question or each group of questions in the Checkpoint exercise, please type your answer right after the question in this Word document.

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**Checkpoint 5.1 (Please submit your answer to Moodle)**

Error(s) may include in the following sub-questions. If you think there is/are error(s), try to find out and suggest some way(s) to fix the error(s). If no error, please write “No error”.

a)

```
#include <iostream>
using namespace std;
double multiplication(double a, double b){
    int result;
    result = k * j;
    return result;
}
int main(){
    double result;
    result = multiplication(2.5, 1.5);
    cout << result << endl;
    return 0;
}
```

Ans:

The variables k and j in line 5 are not consistent with the parameter list defined in line 3. Therefore, the local variables k and j should be replaced by a and b respectively.

b)

```
#include <iostream>
using namespace std;
void a(){
    a = 8;
    void b(){
        b = 9;
        void c(){
            c = 10;
        }
    }
}

int main(){
    // calling b()
    b();
    return 0;
}
```

Ans:

The assignment of a variable to a function and the definition of a function inside another are not allowed. Moreover, the identifiers a, b, and c conflict with the function names. To fix these errors, we can define functions b and c out of function a and change the variable names a, b, and c to other names that will not conflict with function names.

### Checkpoint 5.2 (Please submit your answer to Moodle)

Student A writes the following code. However, when he compiles the code, some compilation errors are found.

```
#include <iostream>
using namespace std;
int main(){
    int y = 9;
    int x = 7;
    int i = 0;

    while (i < 3){
        if (i % 2 == 0){
            g(x);
            i++;
        }
        else{
            g(y);
            i++;
        }
    }
}

void g(int& k){
    static int num = 6;

    if (k % 2 == 0){
        num += 2;
        k = k + 6;
    }
    else{
        num -= 2;
        k = k - 6;
    }
    cout << num << ", " << k << endl;
}
```

- a) Find out the errors and suggest some ways to fix the errors.
- b) Write down the program output after you fix the errors in (a).

Ans:

A function needs to be declared before using it in lines 10 and 14. Inserting “void g(int &k)” before line 3 would fix it.

4, 1

2, 3

0, -5

### Checkpoint 5.3 (Please submit your answer to Moodle)

Given the following program:

```
#include <cmath>
#include <iostream>
using namespace std;
int k = 10;

void display(int m){
    cout << m << endl;
}

int main(){
    for (int j = 50; j >= 1; j--){
        if (j % 2 == 0){
            k = k + j;
        }
    }
    display(k);
    return 0;
}
```

- a) What is the scope of variable k?
- b) What is the scope of parameter m?
- c) What is the scope of variable j?

Ans:

- a) The entire file.
  - b) The entire function display
  - c) The for loop statement block
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#### Checkpoint 5.4 (Please submit your answer to Moodle)

Given the following program:

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

void f(double &p, double &q, double r, double s){
    double w;
    w = q;
    q = p;
    p = w;
    r = 10 * p;
    s = 100 * q;
}

int main(){
    double a, b, c, d;
    b = 1.1;
    c = 10.1;
    a = 100.1;
    d = 1000.1;

    f(a, b, c, d);
    cout << a << "\n" << b << "\n" << c << "\n" << d << endl;
    return 0;
}
```

a) Write down the expected program output.

b) What would be the program output if line 4 is replaced by “void f(double &p, double &q, double &r, double &s) {” ?

Ans:

```
1.1
100.1
10.1
1000.1

1.1
100.1
11
10010
```