

CS205 C/ C++ Programming - Lab Assignment1

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Part 1 - Analysis

环境:

```
gcc (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
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NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR
PURPOSE.
```

操作系统: Windows10 (家庭中文版64位)

CPU: Intel Core i5-9300H

内存: 8G

Define some functions, and then consider how to solve some data that violate the input requirements

Part 2 - Code

```

#include <iostream>
#include <string>
#include <cmath>
using namespace std;

string readString();

double readDouble(int start, int end);

int main() {

    cout << "The first city: ";
    string city1=readString();

    cout << "The latitude and longitude of first city: ";
    double latitudeOffirst = readDouble(-90, 90), longitudeOffirst =
readDouble(-180, 180);

    double phiOffirst = (90 - latitudeOffirst)/ 180.0 * 3.1415926536;
    double thetaOffirst = (longitudeOffirst)/ 180.0 * 3.1415926536;

    cout << "The second city: ";
    cin.get();
    string city2=readString() ;

    cout << "The latitude and longitude of second city: ";
    double latitudeOfsecond = readDouble(-90, 90), longitudeOfsecond =
readDouble(-180, 180);

    double phiOfsecond = (90 - latitudeOfsecond)/ 180.0 * 3.1415926536;
    double thetaOfsecond = (longitudeOfsecond)/ 180.0 * 3.1415926536;

    double c = sin(phiOffirst) * sin(phiOfsecond) * cos(thetaOffirst -
thetaOfsecond) + cos(phiOffirst) * cos(phiOfsecond);

    double result = 6371.0 * acos(c);
    cout << "The distance between " << city1 << " and " << city2 << " is
" << result << " km" << endl;

    return 0;
}

double readDouble(int start, int end) {
    double num;
    cin >> num;

```

```

    if(cin.fail()){
        cout << "Input type error, must be a number" << endl;
        cout << "program exit" << endl;
        exit(1);
    }else if ( num < start || num > end) {
        cout << "number error, must in range [" << start << ", " << end
<< "]." << endl;
        cout << "program exit" << endl;
        exit(1);
    }
    return num;
}

string readString() {
    string name;
    getline(cin,name);
    for (char const &c: name) {
        if(c==',' ){

        }else if(c==' '){

        }else if (!isalpha(c)) {
            cout << "string error" << endl;
            cout << "program exit" << endl;
            exit(1);
        }
    }
    return name;
}

```

Part 3 - Result & Verification

Test case #1:

input:

```

The first city: Shenzhen
The latitude and longitude of first city: 22.55 114.1
The second city: Beijing
The latitude and longitude of second city: 39.9139 116.3917

```

output:

```
The distance between Shenzhen and Beijing is 1942.84 km
```

Test case #2:**input:**

```
The first city: Shenzhen  
The latitude and longitude of first city: 12 jjj
```

output:

```
Input type error, must be a number
```

Test case #3:**input:**

```
The first city: Shenzhen  
The latitude and longitude of first city: 1800 20
```

output:

```
number error, must in range [-90, 90].  
program exit
```

Test case #4:**input:**

```
The first city: shen@zhen
```

output:

```
string error  
program exit
```

Part 4 - Difficulties & Solutions

"cin.get();" is very important.