## Exercise 1: The Basis of C++

1. **Purpose and requirements**

**Purpose:** Learn the C++ programming method and use the new features improved from C, including: (1) The use of input and output stream; (2) Overloading and default parameters; (3) Reference. (4)Allocate memory using “new” and “delete” operator.

1. **Experiment contents：**
2. Write a program using input and output stream for input and output.

Input two numbers using keyboard, take the operation of addition, subtraction, multiplication and division, respectively. Output the results. Such as: 23+123=146.

1. Define two integer number a and b in the main function, use reference to implement the data exchange in function “void swap(int & x, int & y)”, and print the two integers out in the main function.
2. Write a program using C++ style to solve the “Money Problem”. Exchange 1 RMB to 1, 2, 5 cents RMB, how many kind of manners are there? Output all kinds of exchanges.
3. Write a program using operator “new” and “delete” to allocate memory dynamically. Input n integer array from keyboard, calculate the sum of the elements, and output the maximum and minimum element.
4. Assume there are 50 students in our class (assume the same year), everyone has his/her birthday, the probability of each student has a different birthday(no two have the same birthday) is 0.0296; If there are 100 students，the probability will be 3.0725×10-7(oops, not the same as in our mind). Write a program, input the number of students, and calculate the probability of each student has a different birthday. Then use a simulation method to create each student’s birthday by random number generator. Calculate the simulated probability, and make a comparison with the former one.

[Student’s birthday can be created using random data generator, function “rand()” can generate pseudo-random number between 0-32767. In order to get a random number, we need a seed, different seed will generate different number using “rand()”. We can set seed using function “srand(long int\*)”, usually we use the time of our computer to acquire “seed” by “srand((unsigned) time(NULL))”. In order to use the functions mentioned above, we should include the header file “stdlib.h”]

**3. Questions：**

Think through the experiments, and answer the following questions.

1. C++ using I/O stream operator, what are the benefits compared with C?
2. Reference is an important features in C++, how to use reference in function definition?
3. Compared with dynamical memory allocation function in C, What are the benefits of “new” and “delete” operator in C++?